A Performance-Based Building Code on Statutory Maintenance: Exploring the Translation of Policy to Practice for Multi-storey Residential Buildings in Australia

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Abstract

Each state and territory in Australia have adopted its own form of building regulation that incorporates the National Construction Code (NCC) for the design, approval and construction of buildings. The use of performance solutions to meet the performance provisions within the NCC has inadvertently increased a dependency on the active and passive fire safety systems that are required to be maintained over the life of a building. Several different forms of building policy, including for the maintenance of these systems, create a confusing situation for the community, building owners and owners' corporations alike that operate throughout Australia.

A critical review of the literature demonstrates that there is minimal research undertaken in this complex area. This thesis, therefore, builds on and expands the existing body of knowledge related to the regulatory framework and policy regarding statutory maintenance of buildings' fire and life safety systems through a predominantly deregulated performance-based building code.

The research examined the links between building owners, including owners' corporations that own multi-storey residential buildings in Australia, their level of understanding of their responsibilities, and the implications for maintaining fire safety systems in multi-storey residential buildings. The thesis demonstrated how the relationship between policy and its regulation and practice influenced the level of compliance. Drawing on Ajzen's theory of planned behaviour, the objective of this thesis is to examine empirically the effect of attitude, subjective norm and perceived behavioural control on the intention of building owners to engage in the actual behaviour on policies governing the maintenance of fire and life safety systems of buildings. Further, the effect of intention on behaviour has been tested by the moderation effect of policy enforcement by the regulator to explore whether the effect is significantly stronger when a high level of enforcement is present.

A quantitative research method was used to determine the actual level of compliance of statutory maintenance for multi-storey residential buildings. The study reviewed the number of buildings affected, the number of buildings inspected, and the number of fully compliant buildings based on data collated by local governments in New South Wales and Victoria that were identified with containing multi storey residential apartment buildings. This data, although not easily available, was sourced from local council building departments, based on the inspection and fire safety compliance mechanisms that they have, and building registers generally. The second part of this study drew on Ajzen's theory of planned behaviour (TPB) to develop a questionnaire for a survey of owners of multi-storey residential buildings and their representatives to ascertain their attitudes, subjective

norms and perceived behavioural control to determine their behavioural intention and ultimately their behaviour. These data were analysed using structural equation modeling using Smart PLS 4.

This study employed eight hypotheses, six of which specifically addressed Ajzen's theory of planned behaviour (TPB), considering both the presence and absence of enforcement by the regulator as a moderating factor. Four of the six hypotheses with enforcement were not supported, while four of the six hypotheses without enforcement were supported.

The results suggest that there is a positive relationship between attitude and intention by building owners and their representatives to undertake the act; social pressure from important referents was also positively related to intention, however perceived behavioural control and the ability to undertake the act was not supported. Moreover, the findings suggest that building owners lack the necessary support and backing from regulatory bodies to effectively manage the intricate maintenance activities required for complex fire safety systems.

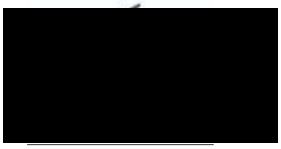
This thesis is the first to use Ajzen's theory to determine a building owner's intention with respect to maintaining fire and life safety systems. The recommendations for regulators and building owners from this study address the achievement of long-term compliance with policy, reducing risk and enhancing consumer safety.

Student Declaration

Doctor of Philosophy Declaration

I, Stephen Scimonello, declare that the PhD thesis titled '*A performance-based building code on statutory maintenance: Exploring the translation of policy to practice for multi-storey residential buildings in Australia'* is no more than 80,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

I have conducted my research in alignment with the Australian Code for the Responsible Conduct of Research and Victoria University's Higher Degree by Research Policy and Procedures.

Signature:  Date: 27 February 2024

Ethics Declaration

All research procedures reported in the thesis were approved by the Victoria University Human Research Ethics Committee, approval number ID: HRE20-056.

Signature:  Date: 27 February 2024

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Conference Presentations and Papers

Some sections of this thesis have already been presented at a conference and published in the conference proceedings:

Scimonello, S., Armstrong, A., & Shee, H. (2019, November 6–8). *A performance-based building code on statutory maintenance: Exploring the policy for consumer safety in Australia*. 43rd AUBEA Conference (Australasian Universities Building Education Association Conference), Noosa, Queensland, pp. 489–503.

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Scimonello, S. (2019, May 16–18). *The direction of AIBS professional and education pathways – Do education providers respond adequately to the new professional building surveyor?* [Conference session]. Queensland & Northern Territory Chapter Conference, Australian Institute of Building Surveyors, Brisbane.

Scimonello, S. (2019, March 7–8). *The direction of AIBS professional and education pathways* [Conference session]. South Australia Chapter Conference, Australian Institute of Building Surveyors, Adelaide.

Scimonello, S. (2019, October 24–25). *Future training possibilities* [Conference session]. Western Australia Chapter Conference, Australian Institute of Building Surveyors, Perth.

Scimonello, S. (2020, March 5–6). *Future training directions and alignment with the accredited professionals scheme* [Conference session]. South Australia Chapter Conference, Australian Institute of Building Surveyors, Adelaide.

Scimonello, S., Armstrong, A., & Shee, H. (2022, November 7–8). *Outcomes of research for ongoing fire safety in apartment buildings in NSW vs Victoria* [Conference session]. NSW & ACT Chapter Conference, Australian Institute of Building Surveyors, Sydney.

Scimonello, S., Armstrong, A., & Shee, H. (2022, November 4). *Exploring the translation of policy to practice for consumer safety for multi-storey residential buildings in Australia using a performance-based building code* [Conference session]. Resilience and Impact in Research: Dealing with Disruptions, Victoria University Building School Higher Degree by Research Conference, Victoria University, Melbourne.

Scimonello, S., Armstrong, A., & Shee, H. (2022, December 5). *Exploring local government policy for community safety in buildings regulated by the code on statutory maintenance* [Conference session]. Research Seminar, Armstrong Institute, Melbourne.

Scimonello, S. (2023, March 2–3). *National Construction Code key issues and education* [Conference session]. South Australia Chapter Conference, Australian Institute of Building Surveyors, Adelaide.

Scimonello, S. (2023, June 22–23). *AIBS accreditation system – ABCB response to the Building Confidence Report – Requirements for building reports* [Conference session]. Queensland and Northern Territory Chapter Conference, Australian Institute of Building Surveyors, Brisbane.

Scimonello, S. (2023, May 11–12). *AIBS audit scheme – Establishing a national consistent approach for compliance assessment* [Conference session]. Western Australia Chapter Conference, Australian Institute of Building Surveyors, Perth.

Scimonello, S., Armstrong, A., & Shee, H. (2022, November 15). *Using management methodologies to solve fire safety concerns on residential apartment buildings in a post-construction environment* [Conference session]. Tasmania Professional Development Day, Australian Institute of Building Surveyors, Tasmania.

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List of Abbreviations

ABCB:	Australian Building Codes Board
ABS:	Australian Bureau of Statistics
AIBS:	Australian Institute of Building Surveyors
AMUBC:	Australian Model Uniform Building Code
AS:	Australian Standards
Att:	attitude
AUBRCC	Australian Building Regulations Coordinating Council
BCA:	Building Code of Australia (also known as the National Construction Code)
BIM:	building information modeling
BwoF	building warrant of fitness
COAG:	Council of Australian Governments
ESM:	essential safety measure/s; also refers to fire and life safety systems
GoF:	goodness of fit
ISCUBR:	Interstate Standing Committee on Uniform Building Regulations
NCC:	National Construction Code (also known as the Building Code of Australia)
NSW	New South Wales
PBC:	perceived behavioural control
PLS:	partial least squares
SEM:	structural equation modeling
SN:	subjective norm
SPSS:	Statistical Package for Social Sciences
TPB:	theory of planned behaviour
UBR:	Uniform Building Regulations
VMBSG:	Victorian Municipal Building Surveyors Group
VUHREC:	Victoria University Human Research Ethics Committee

Definitions

Owners' corporation	In Victoria (formerly body corporate), manages the common property of a residential, commercial, retail, industrial or mixed-use property development. In NSW (formerly body corporate), is made up of owners of a strata scheme who automatically become part of the owners' corporation.
Building owner	Refers to an owner of an apartment in a complex that is part of this study and who is part of the owners' corporation.
Policy	The term 'policy' in this thesis refers to the relevant regulations and/or requirement to maintain a building's essential fire safety systems over the life of a building. These are known as 'essential safety measures' or 'safety measures' or 'safety features' in different states and territories.
Essential fire safety systems	Means essential safety measure or safety measure or fire safety feature and can be an active or passive system as defined in the ABCB publication titled *Maintenance of Safety Measures, Equipment and Energy Efficiency Installations Handbook*. These systems are commonly referred to throughout this thesis as 'fire and life safety systems'.
Multi-storey residential building	Refers to any residential building containing two or more residences (NCC 2019 definition sole-occupancy unit) with three or more storeys in height (NCC 2019 BCA Class 2).
Performance Base Building Code	A statutory instrument where flexibility is permitted in achieving the required outcomes. A performance-based code is considered a 'soft' form of law.
Performance Based Solution	In this context means a method of complying with the performance requirements of the Building Code of Australia other than by a deemed-to-satisfy solution.
Regulators	Refers to state or territory authorities that administer building control within the state and local government areas. This can also include state

	or territory departments, authorities and local governments who have the delegation to administer building control within their jurisdiction.
Compliance	Compliance refers to a building meeting the relevant state-based rules, regulations, and codes for its design, construction and maintenance requirements.

Chapter 1: Introduction

1.1 Introduction

This thesis will comprehensively examine the implications of ongoing maintenance of fire and life safety for building owners of multi-storey residential apartment buildings in a deregulated and privatised building environment for the design, approval and construction of buildings. Through the application of a theoretical model, this research identifies and provides recommendations to enhance community safety and mitigate risks for regulators, insurance providers and residents of these buildings in a post-construction environment.

The chapter begins with a background of the study (section 1.2) that identifies a problem that has been exacerbated through a privatised building regulatory environment using a performance-based building code. Section 1.3 provides the objectives of this study by articulating the purpose of the thesis and conceptualising a strategy aimed at promoting compliance. The research questions and scope are discussed in section 1.4, and the study objectives are identified that provide the research questions. The next stage discusses the benefits of this study (section 1.5) and provides the context for this to occur, then section 1.6 highlights the contribution of knowledge in academic and practical domains, culminating in a conclusive statement of significance (section 1.7). The thesis outline, presented at the conclusion of this chapter, provides a comprehensive overview of all chapters in this study.

1.2 Background

In Victoria, the shift in deregulation initiated by the Kennett government reforms in the 1990s transformed the landscape of building policy. This evolution transitioned the administration of building policy from local government control to a fully privatised and deregulated system (Barbaro & Marfella, 2019; Lovegrove, 2021; Van der Heijden, 2010). Consequently, there is now a heightened reliance on building owners to uphold, self-certify and manage complex and bespoke fire and life safety systems in their multi-storey residential apartments.

The deregulation of the building industry resulted in a paradigm shift that allowed private building surveyors appointed by developers to approve complex multi-storey residential apartments that required intricate fire safety systems to be installed without the necessary auditing of those same private building surveyors (Victorian Auditor-General, 2011, p. 11). These fire safety systems are known as essential safety measures (ESM) in Victoria, and they are required to be maintained at predetermined frequencies and standards by building owners (Victorian Building Authority, 2020) over the life of the building. It is the role of local government authorities through the Victorian

Building Act 1993 to administer and enforce the policy through regulation (Moullier et al., 2013; Productivity Commission, 2004), and many local governments were unaware of their new responsibilities in a post-construction environment emanating from the introduction of this Act (Lovegrove, 2021). The upkeep and maintenance of these buildings lack consistency across the state as local governments conduct minimal inspections with no mandatory notification required by building owners regarding upkeep of their fire and life safety systems, leading to identified noncompliance issues that pose potential threats to community safety (Barbaro & Marfella, 2019, p. 364; Better Regulation, 2023; Productivity Commission, 2004).

Similarly, the NSW instigated reforms in the late 1990 through the NSW Planning and Environment Act where the industry for building approvals saw the introduction of private building certifiers being able issue approvals (Lovegrove, 2021). Private Certifiers and Council Building Surveyors through the consent authority (local Councils) compete in the market for building approvals (NSW Government, Department of Fair Trading, 2024). Private Certifiers can check building plans and issue a construction certificate, that certifies that the building complied with the Development Consent and the technical standards including National Construction Code (Barbaro & Marfella, 2019). However, in NSW an annual fire safety statement is required to be completed and submitted by the owner of a building that has a BCA classification of 2 through to 9 including multi-storey residential apartment buildings. It is only buildings that are classified as being a BCA Class 2 to 9 that have been the subject of a building approval or fire safety notice by the local council after 1 July 1988 that are required to comply with the policy (Department of Planning and Environment, 2023). The annual fire safety statement must be provided to the local authority and the NSW Fire & Rescue Service in addition to having it displayed in a prominent position in the building. There appears to be a gap in the provisions for buildings constructed prior to 1 July 1988 that have not been subject to a building approval or a fire safety notice, as there are no annual reporting and compliance requirements.

Through the author's experience conducting numerous fire safety inspections on commercial-style buildings in Victoria, including multi-storey residential apartments from the introduction of the Victorian building regulation reforms in the 1990s, it has been found that most of these buildings were deficient in their maintenance obligations, resulting in higher risks for building occupants and the community at large. When fire safety systems are not maintained, can lead to catastrophic consequences that place the life and safety of building occupants at risk (Carter, 2019; Shergold & Weir, 2018), with deaths occurring in extreme examples (Barnes, 2006; White, 2009). As Victoria was the second state to fully adopt privatisation for the design, approval and construction of buildings, with all states and territories subsequently adopting a privatised building system (Lovegrove, 2021), the problem of fire and life safety in a post-construction environment is not just isolated to Victoria but also exists in other states and territories. Recent government reports have confirmed this issue

(Construct NSW, 2021; Productivity Commission, 2004), and it is also true for other countries (Rahardjo & Prihanton, 2020).

1.3 Objective of the Thesis

Drawing on Ajzen's theory of planned behaviour, the objective of this study is to examine empirically the effect of attitude, subjective norm and perceived behavioural control on the intention of building owners of multi-storey residential apartment buildings to engage in the actual behaviour on policies governing the maintenance of fire and life safety systems of buildings.

Further, the effect of intention on behaviour has been tested by the moderation effect of enforcement of the policy by the regulator to explore whether the effect is significantly stronger when a high level of enforcement is present.

A number of research studies have reviewed building enforcement provisions (Productivity Commission, 2004; Van der Heijden, 2008) with the purpose of ensuring building enforcement is widely understood (Van der Heijden & de Jong, 2009). However, there appears to be minimal research completed that relates to the maintenance and management requirements of buildings (Horner et al., 1997; Lind & Muyingo, 2012; Stone & Cluff, 2015). Some researchers have reviewed fire safety concepts in maintenance strategies (Wong & Xie, 2014), while research into the implications of a performance-based building policy regarding ownership obligations has clearly been neglected. Furthermore, in recognising the existing gap in research and acknowledging the relatively recent adoption of the performance-based building policy in Australia (Australian Building Codes Board, 2019c) it is evident that the impact on continuous maintenance throughout the lifespan of multi-storey residential buildings has not kept up with the advancements in modern building codes and developments (Shergold & Weir, 2018).

As building codes become more complex due to the use of performance assessments to reduce construction costs (Barbaro & Marfella, 2019; Shergold & Weir, 2018; The Centre for International Economics, 2013; Nwadike & Wilkinson, 2021), this places greater emphasis on active and passive systems. Many of these active and passive systems are too complex in nature for building owners to understand how they work and what is required for them to be maintained. Further, it is a requirement in Australia that active and passive fire and life safety systems be maintained and fit for purpose over the life of the building for those buildings to be occupied. From the research literature, the policy to maintain these systems is complex and confusing, with minimal research undertaken to examine the translation of policy to practice. This field is important, as if these systems are not maintained and fit for purpose to operate when intended, places greater risk on the lives of building occupants to evacuate the building safely (Shergold & Weir, 2018).

This study will address the existing gap in the literature by expanding on the incorporation of a performance-based building code, specifically examining its influence on ownership responsibilities concerning statutory maintenance in multi-storey residential buildings. Furthermore, the research will assess the repercussions of relying on active and passive fire and life safety systems to consistently function as intended throughout the lifespan of such buildings under a performance-based building code.

1.4 Research Question and Scope of this Thesis

From the regulatory environment being examined as a result of noncompliant building products (Department of Industry Science Energy and Resources, 2019) through the cladding fires on multi-storey residential apartment buildings that placed a spotlight on building fire safety (Barbaro & Marfella, 2019; Shergold & Weir, 2018) and emanating from the theoretical framework by Ajzen (1991), this study aims to focus on the relationships between building owners and owners' corporations that own multi-storey residential buildings and explore socio-technical barriers to compliance with statutory maintenance objectives. The adoption of building policy and its implementation in regulation and outcomes for stakeholders is investigated.

The study sub-objectives are:

- to review implications for owners of multi-storey residential buildings who do not maintain their essential safety measures as required by policy
- to determine the links and interdependencies between building owners and owners' corporations and their level of understanding of the performance-based building code and regulations
- to determine factors associated with sustained compliance for ongoing fire and life safety systems from owners, and owners' corporations.

The research questions that have been identified to meet the above objective are:

> *RQ1. To what extent do the constructs within the theory of planned behaviour (attitude, subjective norm and perceived behavioural control) influence the intention of building owners, companies and owners' corporations that own multi-storey residential apartment buildings to maintain the fire and life safety systems in their respective buildings?*
>
> *RQ2. How is policy implemented in practice within a deregulated building regulation environment to ensure compliance of statutory maintenance for building owners and companies including owners' corporations that own multi-storey residential buildings in NSW and Victoria?*

RQ3. To what extent do penalties provide a compliance mechanism (compliance theory) regarding a building owner's obligations to maintain their building's fire and life safety provisions?

RQ4. Is the TPB a good fit to establish a building owner's intention to carry out statutory maintenance on their respective multi-storey residential apartment building?

RQ5. Do demographic variables contribute to undertaking the intention to carry out statutory maintenance on multi-storey residential apartment buildings?

The research questions will be tested against the theoretical framework drawn from Ajzen (1991) to determine the attitudes, subjective norms and perceived behavioural control of building owners and their representatives to determine their intentions, with enforcement by the regulator as a moderating effect in order to ultimately influence behavioural change and government policy. This will enable a solution to be developed for building owners and regulators to ensure long-term compliance of the policy through regulation.

1.5 Academic and Practical Benefits

The practical benefits of this research will be the further exploration of the policy for maintenance of multi-storey residential buildings with respect to fire and life safety systems emanating from a deregulated performance-based building code. Recent building cladding fires in Melbourne such as the Lacrosse fire at Docklands and the Neo 200 fire in Spencer Street have demonstrated the need for greater research in this area.

The Australian Building Codes Board (ABCB) predicts that only 50% of owners of buildings realise the potential benefits of using performance solutions in the building approval and construction process (The Centre for International Economics, 2013, p. 32). Therefore, there will be greater expansion of performance solutions as a compliance mechanism for multi-storey residential buildings that will further increase maintenance obligations for owners. However, a report commissioned by the ABCB concluded that there is growing anecdotal evidence of high levels of building defects and noncompliance with building codes that lead to increased rectification costs, community safety concerns and loss of value for affected buildings. These issues were costed to be in the order of A$2.5 billion per year (The Centre for International Economics, 2021, p. 3), emanating from a performance-based building code.

The key benefit of compliance with the policy will be the assurance that all fire safety systems including fire and life safety systems are being maintained and fit for purpose. This will ensure that buildings remain lawfully occupied with the safety of occupants maintained. With over $1.1 billion a

year spent on building construction, the use of performance-based solutions are on the rise to reduce construction costs (The Centre for International Economics, 2013). Saghatforoush et al. (2011) confirm that the operation and maintenance costs for a building over its lifetime are in the vicinity of 50% to 80% of the total cost of construction, and this figure places a heavy burden for building owners and owners' corporations alike. Currently it is not known how many buildings are compliant with statutory maintenance policy or if they are being maintained. To gain an early indication of the potential size of the problem, data was obtained from two Victorian municipalities from their active ESM audit campaign. Out of 920 buildings audited, only 28 were found to be compliant with policy. As each Victorian council is required to undertake fire safety audits, the findings of this initial research provide an indication of the remaining municipalities across Victoria and the degree of compliance that has been achieved. From these initial results, it could be argued that there is a lack of understanding of fire and life safety policy, with the implications of noncompliance for property owners and their representatives not fully understood (Denman et al., 2024). This lack of understanding and noncompliance may void future potential insurance claims for owners and business as well as expose their operational and economic responsibility to future compensation claims and negligence proceedings (Bell, 2017). Therefore, the implications from this research will demonstrate that action is required and will extend to impact all residential property owners, including companies and owners' corporations that have commercial-style property exposure in Australia.

Based on the findings of this study, recommendations are provided for building owners and regulators outlining long-term obligations aimed at enhancing the safety of building occupants. The recommendations are designed to aid building owners, including their representatives overseeing multi-storey residential apartment buildings, in mitigating risks associated with building usage. The ultimate goal is to foster a safer and healthier environment that encompasses community protection and aligns with building policies, ensuring benefits for everyone involved.

The academic benefits of maintaining fire and life safety measures in multi-storey residential apartment buildings are substantial and this study will underscore the critical relationship between community safety and academic research. By examining how building owners' intentions to uphold fire and life safety systems to influence their behaviour, this research will significantly contribute to academic knowledge in this field. The findings will not only enhance our understanding of safety practices but also shape future academic contributions, driving further studies and innovations in maintaining fire and life safety standards in multi-storey residential apartment buildings to enhance community safety.

1.6 Contribution to Knowledge

1.6.1 Academic Contribution

There does not appear to be an extensive understanding of ongoing maintenance costs that have been considered in research (Bukowski & Babrauskas, 1994; Horner et al., 1997; Shergold & Weir, 2018). Van der Heijden and de Jong (2009) argue that it is necessary for building regulation to be widely understood and that theoretical literature in building regulation and policy is required. This study will help to fill this void in terms of the knowledge and research that will review why companies have not applied statutory maintenance ownership obligations to their building stock.

The review of maintenance implications for companies that rely on buildings generally has been well researched by academics and facility managers over the years (Horner et al., 1997; Lind & Muyingo, 2012; Stone & Cluff, 2015). However, the relatively new concept of performance-based building policy in Australia and its impact on statutory maintenance for multi-storey residential buildings is novel in this research.

As there is a shift to integrate a deregulated approach to performance-based building policies in Australia (Van der Heijden & de Jong, 2009; Shergold & Weir, 2018), fire and safety systems are a product emanating from this policy, and the importance and significance to academics and the public is clearly not fully understood (Kodur et al., 2020; Spinardi, 2019; van der Pump & Scheepbouwer, 2023). This study will be original as it will be the first to identify statutory maintenance obligations for a building owner reliant on fire and safety systems to be functional and fit for purpose over the life of a building and will extend to all commercial buildings in Australia.

The theoretical framework developed in the study will enable the research to determine how the various attitudes, beliefs and practices of stakeholders determine their response to fire and safety systems policy and its potential longer-term impacts. It will also add to the research literature on the most effective means of mobilising stakeholders to adopt fire and life safety measures.

By examining building owners' and their representatives' attitudes towards self-certification and reliance on the private sector, this study sheds light on the challenges they face in maintaining complex and bespoke safety systems. The findings will shed light on an owners' attitudes towards fire and life safety maintenance to influence their intention and ultimately their behaviour using Ajzen’s TPB, as there is a general lack of confidence in their ability to undertake these tasks due to a limited understanding of the policies. This research significantly contributes to the academic discourse by integrating TPB into the context of building safety, providing a new perspective on owners' behaviour and intentions. The methodological approach for this study will use statistical analysis, specifically

structural equation modelling, to address the research objectives and test the hypotheses. This analysis will be guided by the interpretation of the constructs of the Theory of Planned Behaviour (TPB).

A practical outcome is an evaluation of a performance-based approach and drawing conclusions about its effectiveness.

1.6.2 Practical Contribution

Recent events such as the Lacrosse tower fire at Docklands in Melbourne (Shergold & Weir, 2018), the Grenfell tower fire in England (Hackett, 2018) and the Neo 200 cladding fire that occurred in Melbourne have placed a spotlight on the reliance of a building's fire and life safety systems to be fit for purpose and maintained and operated as intended to ensure occupant safety in emergency situations (Carter, 2019). This absence also has occurred in other events such as the Brunswick rooming house fire that killed two people; its cause was predominantly reviewed as a lack of and insufficient maintenance of their fire safety systems (White, 2009). These events have placed ongoing scrutiny on a deregulated building enforcement process across Australia for the design, construction and maintenance of buildings (Shergold & Weir, 2018) to ensure that the fire and life safety systems installed in those buildings operate when intended throughout the lifespan of the building (Australian Building Codes Board, 2021b). Only recently have regulators acknowledged this risk and initiated a holistic review of the maintenance of fire and life safety systems (Auditor-General of New South Wales, 2022; Better Regulation, 2023; Queensland Fire and Emergency Services, 2023). This in addition to the governments of NSW (NSW Government Department of Planning, 2023) and to a lesser extent Victoria (Victorian Building Authority, 2019) requiring maintenance personnel to be accredited and appropriately trained to ensure that fire and life safety systems are being appropriately maintained.

This research will be a first to provide the data and evidence regarding the adequate compliance of fire and life safety maintenance of multi-storey residential apartment buildings. This research will also provide practical recommendations for building owners, their representatives and the regulator to improve ongoing compliance with the policy through effective regulation that governs statutory maintenance requirements of those buildings.

1.7 Statement of Significance

The significance of this research will highlight the risks that building owners and owners' corporations are exposed to by not having an awareness of their obligations regarding fire and life safety maintenance of multi-storey residential buildings. This has the potential to shift current industry paradigms and reduce exposure to risk and potential future insurance claims.

A proposed solution for owners' corporations, building owners and regulators that could be concluded from the literature is that a framework be developed. This framework could also be incorporated into subsequent management agreements and strategic maintenance plans for owners' corporations and tenants, with ownership obligations identified for the long-term compliance of that building. This framework will assist building owners, including owners' corporations who own multi-storey residential buildings, to reduce their risk in terms of the building's use and create a safer and healthier workplace that is compliant with occupational health and safety requirements and building policy. The net benefit generally to the Australian economy by using performance-based building codes for the assessment of commercial buildings is approximately $780 million per year (The Centre for International Economics, 2013). A study completed by the Productivity Commission (2004) concluded that with the increased use of performance assessments in the approval stage of a building, an increase in maintenance costs occurs over the life of a building.

Currently it is not known how many buildings are compliant or are being maintained through a predominantly privatised performance-based building code. The outcome of this research will assist property owners, owners' corporations and their representatives to realise their risk as building owners or holders of long-term lease agreements by understanding their obligations. This research will also review the current policy outcomes to ensure that regulators pay more attention to the risk buildings pose by not being maintained in accordance with occupancy conditions and therefore place greater emphasis on compliance mechanisms.

Of greatest significance is that a reliable compliance regime has the potential to save lives. This review will therefore examine current literature that can be influenced by the essential safety measures (ESM), commonly referred to throughout this thesis as fire and life safety systems, and the impact on building management in a deregulated environment. In addition, the problem will be explored through a cause-and-effect approach, with existing evidence to be identified and relationships between policy, regulation and industry practice to be explored to determine the level of compliance.

1.8 Thesis Outline

The thesis consists of eight chapters. Chapter 1 provides an introduction and background of the problem for the research and then moves on to the context and purpose. This part sets the scene to ensure that the problem is understood and includes a brief historical background. Research questions and scope are discussed, including contribution of knowledge both academic and practical, with a statement of significance for the research provided. A detailed description of compliance mechanisms against national construction codes demonstrates the complexities and extent of the problem involved in maintaining highly complex and bespoke fire safety systems.

Chapter 2 provides the context of the study and commences with the historical background, discussing the evolution of building policy in Australia and the formation of the nationalised Building Code of Australia, including the adoption of a fully performance-based code for the design, construction and maintenance of buildings. Further details are provided based on Victoria's and NSW's building system for context. The chapter then discusses the extent of multi-storey residential apartment buildings in Australia and delves into the policy and the implications this has.

Chapter 3 provides a review of the literature within the context of the study, including the policy imposed throughout Australia regarding maintenance of existing buildings and the implications for consumer safety when not achieved. This is the legislative background for the study, and the chapter examines the differences in legislative frameworks around Australia for owners required to maintain their building's fire and life safety systems, in addition to ensuring that an understanding of building policy through regulation is achieved. The chapter then moves onto the theoretical framework to be used and includes the problem identification, being the reliance on owners to ensure the complex maintaining of their fire and life safety systems is completed over the life of the building. The framework using Ajzen's theory is discussed in detail, showing that this framework is suitable for this study. The chapter then concludes with a discussion highlighting the literature gap identified.

Chapter 4 presents the framework and background used in this study. A detailed analysis and discourse are presented on the theoretical framework, unveiling the research questions and hypotheses. The interconnections within Ajzen's theory of planned behaviour (TPB), specifically attitudes, subjective norms and perceived behavioural control, are explored, emphasising their relevance to intention to ultimately influence the behaviour of the individual. The chapter also explores the regulator's enforcement of policies to attain compliance and discusses potential strategies to achieve this objective.

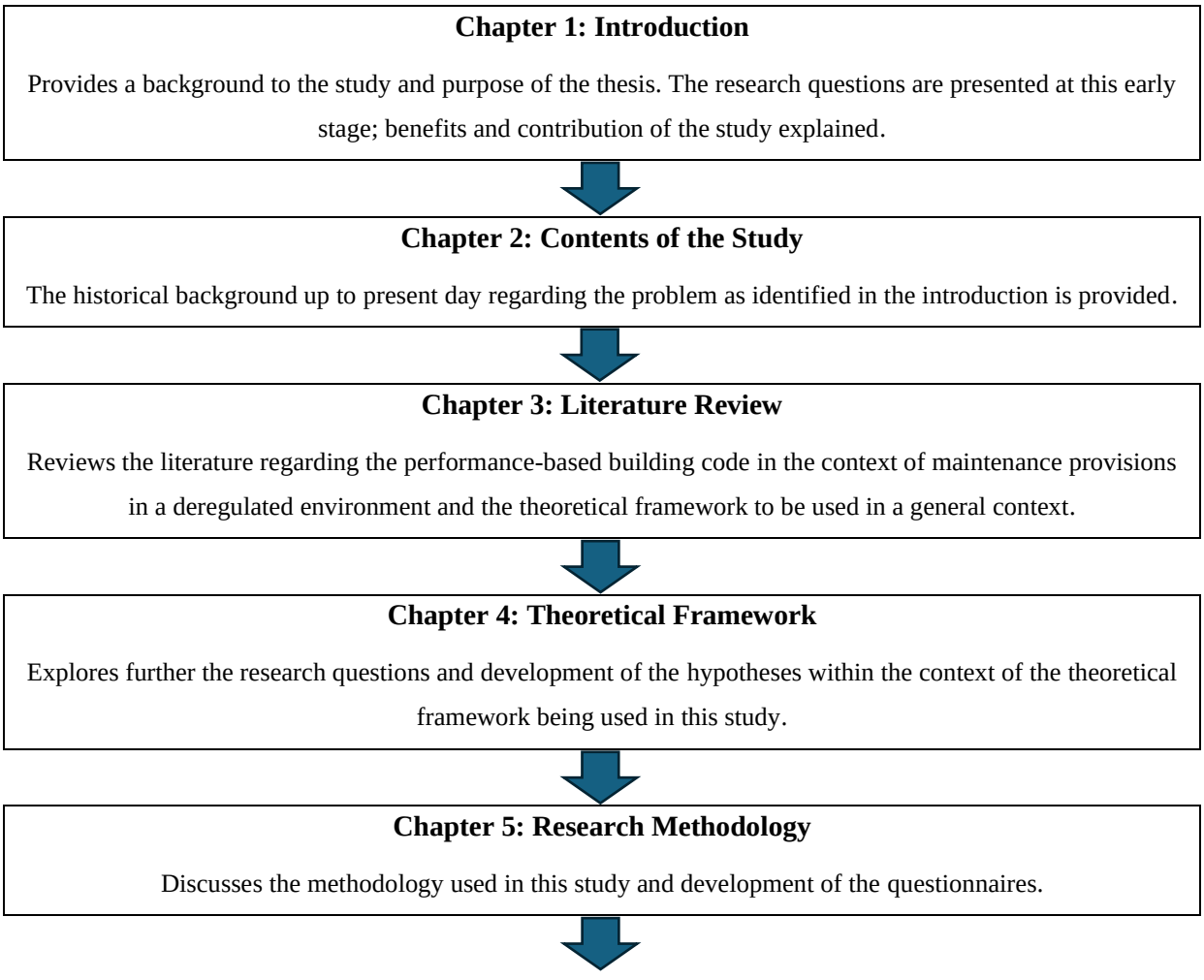
Chapter 5 outlines the research methodology employed, offering insights into the principles of the research paradigm and introducing the research objectives. The chapter provides a detailed account of the research design and methodology, incorporating a summary of the literature review that contributed to defining the problem and research questions and confirming the population and sampling frame used. Subsequently, the chapter addresses the development and structure of the questionnaire, elucidating how the analysis was used to obtain the results.

Chapter 6 provides the results of the study of local governments and building owners and their representatives in NSW and Victoria. The details of the number of buildings are provided, with analysis on how this number was achieved. The chapter discusses how data cleaning was completed while providing the core results of the screened survey responses, and then reveals the results of the evaluation of the model against the research questions using IBM's SPSS and partial least squares

structural equation modeling (PLS-SEM). The chapter concludes with the moderating effect, being enforcement by the regulator, on the model and relationships and the final results of the model.

Chapter 7 thoroughly examines the results and offers a comprehensive discussion exploring the implications for the study. Each finding is meticulously dissected in relation to the research questions, hypotheses and the theoretical model employed. The chapter culminates by elucidating the practical implications of the findings, shedding light on their relevance in current contemporary settings and addressing the theoretical implications stemming from the study's outcomes.

Chapter 8 provides the conclusion to this thesis, summarising the ultimate findings and outcomes of the research objectives. It includes a section on implications, addressing both theoretical and methodological considerations. The chapter offers recommendations intended to aid building owners and regulators in comprehending the problem identified in Chapter 1, with a focus on ensuring continual community safety for residents of multi-storey residential apartment buildings. Limitations of the study are acknowledged, accompanied by recommendations for future research. The chapter concludes with a final remark and a concise summary of the entire research endeavour. Figure 1-1 shows the paths of the chapters used in this thesis.



Chapter 6: Results

Provides the core results of the model used through the use of SPSS and PLS-SEM.

Chapter 7: Discussion and Implications

In-depth discussions regarding the results are provided. Implications of the findings of the study are discussed regarding the impact to community safety for building occupants and the regulator.

Chapter 8: Conclusion

Provides a conclusion to the research questions; contributions to knowledge and recommendations provided. Limitation of the study and further research opportunities are presented.

Figure 1-1: Pathway of the Chapters used in this Thesis

1.9 Summary

This chapter provided a background of the problem identified, which revolves around the maintenance of fire and life safety systems by building owners and their representatives in a post-construction environment for multi-storey apartment buildings. The purpose of the thesis was discussed, and the research questions and scope were defined based on the literature.

The chapter also addressed the academic and practical benefits of the study, highlighting its contributions in both areas, along with emphasising the study's significance. Finally, the chapter concluded with an overview of the subsequent chapters.

The next chapter will discuss the context of the problem identified, with the historical background and the evolution of building regulation from its inception in England to present-day Australia. The chapter will conclude with detailing the extent of multi-storey residential buildings in Australia and the implications these have for unsuspecting building owners.

Chapter 2: Context of the Study

2.1 Introduction

This chapter begins with a historical background of the evolution of building policy that commences with the inception of building codes in England and then moves to an Australian context (section 2.2), to provide the background of the study. The section then shifts to the evolution of building policy in Australia and focuses on Victoria as a case study that describes the commencement of maintenance for commercial-style buildings. The section then discusses the background to the Building Code of Australia (section 2.3) and the implications that provide the issues regarding the performance-based building code (section 2.5). Further examples are provided using Victoria and NSW as case examples (section 2.6 and 2.7), and then the chapter moves onto the Commonwealths' recommendations for the maintenance of buildings (section 2.8). The extent of multi-storey residential apartment buildings is detailed to provide context to the problem identified (section 2.8) and the implications of this for Australia (section 2.10). Finally, a summary of Chapter 2 is provided detailing the main findings to be explored (section 2.11).

2.2 Historical Background

2.2.1 The Evolution of Building Policy in Australia

As building policy evolved throughout history through at times major catastrophic events such as the Great Fire of London in 1666 that exposed its deficiencies, it provided a shift to safeguard community safety through incremental change and code development (O'Brien, 2016). Changes as a result of the Great Fire of London were essentially the first to protect people from fire, due to the large public outcry of over 100,000 people made homeless from the 13,200 houses, 84 churches and 44 halls destroyed (Field, 2017). Although there were only four recorded deaths, many believed that the death toll was far greater (Robinson, 2011). Following the fire, Parliament introduced the London Rebuilding Act of 1667; this commenced a formal prescriptive law that stipulated fire safety measures such as brick or stone walls to divide buildings to protect from fire, imposed maximum storeys that a building could be constructed to and imposed limits on the number of occupants in buildings to prevent overcrowding (United Kingdom Parliament, 2021).

In Australia, the first recorded building policy came with the First Fleet in 1788 with the landing in Port Jackson by Governor Arthur Phillip, who raised the British flag to proclaim the colony of New South Wales (O'Brien, 2016). This system gave the governors of NSW the only authority in the colony to enforce British laws and doctrine. Existing legal doctrine allowed Parliament to make laws

and establish government in colonies (including Australia); this process was known as the doctrine of reception (Vickery & Pendleton, 2003). Until the formation of parliaments within the colonies, the predominant laws were 'paramount' law; this means that the governors of the colonies were authorised to make and uphold laws, including for the construction of buildings. This resulted in new Australians complying with British standards and common law; however, it allowed colonists to be at the whim of the governor of the day. The foundation of contemporary building laws in Australia was extant British law, and Australia was in fact a colony of Britain, with legal institutions being the Crown, Parliament and governors (Enright, 1989).

The first recorded building regulation identified in the colony and passed by the Governor was the order by Governor Lachlan Macquarie on the 11 August 1810 that included a requirement being "*no building is to be erected without the prior consent from the Acting Surveyor*" (New South Wales Government, 2021). As such, the governors shared responsibility with builders for the standards of building construction until the proclamation of the Sydney Building Act (NSW) of 1837, being the *Regulating Buildings and Party-Walls and for Preventing Mischiefs by Fire in the Town of Sydney* (Logan, 1987). This Act was highly prescriptive in nature, did not allow deviation from construction techniques and categorised buildings into classes according to size. The Act also banned thatching, bark and wooden shingles for roof cladding and prescribed construction techniques for certain buildings, such as houses to have a ground floor of more than 9 building squares, with party walls being brick or stone to be 30 ½ inches thick at the base and 13 inches thick at the top floor if located beside an existing building of similar size. Restrictions of height and storeys were also prescribed, such that churches, factories and the like that were three storeys or greater were to be constructed of the same wall thicknesses with materials being of brick or stone (Logan, 1987). Following this Act for Sydney was the Melbourne Building Act of 1848 (Victorian Historical Acts, 1848) that was essentially similar to that of the Sydney Building Act with the same prescribed building and construction techniques. This prescriptive nature of building policy came about because of the first fire in Sydney, being the first Church of St Phillips that was burnt to the ground in 1798. This church was noted as having slab timber and thatched roofing materials that offered minimal fire resistance (Guy, 2006).

With the proclamation of the Commonwealth of Australia in 1901, building regulations for the safety, health and amenity of buildings were essentially neglected in the Australian Constitution. The administration of building policy and regulation was the responsibility of each state and territory (Barbaro & Marfella, 2019; Gleeson, 2001) provided several different forms of enforcement and administrative provisions for the regulation of building and safety standards.

It is important to understand the difference between an Act of parliament, regulations versus technical codes and standards. The legislative process in the Commonwealth of Australia in the making of laws

is based on British practice dating back many centuries and provides for an Act of Parliament, being a law made after a bill (being a proposed law) that is passed in both houses of parliament (the house of representatives and the senate). Once a bill is passed in both houses, it receives Royal Assent by the Governor-General and is then considered an Act of Parliament enforceable in a court of law. A regulation is essentially a set of rules that are a legislative instrument made under an Act of Parliament; however, these are subordinate to an Act and provide for the administrative aspects and behavioural matters to be observed and undertaken (Australian Government, 2021). A technical code provides for a set of rules for products, building requirements and processes. Codes can be adopted into law under a regulation that provides for the set of minimum standards to apply for the safety, health and structural stability of buildings. A standard, such as an Australian Standard, establishes uniform technical criteria to be followed, including processes and methods to be adopted that provide consistency (Standards Australia, n.d.). In the context of this thesis, this would detail the maintenance criteria that is required to be undertaken for a particular fire safety system being installed in a building. This standard would detail *the how and what* to ensure that the building's fire safety system operates as intended. The regulation, being the policy, regulates matters relating to the maintenance of buildings that provide for the administrative processes and behaviour to be followed to comply with the intent of the Building Act to protect the safety and health of people who use buildings (*Building Act 1993* Vic).

As there are several different forms of building policy across Australia, the Victorian building legislative system will be briefly discussed in further detail to provide context to the regulatory and policy requirements for the maintenance of multi-storey residential buildings.

2.2.2 The Victorian Building Regulation System

As discussed, the first policy that dealt with building requirements within the Victorian colonies was adopted in 1848 with the Melbourne Building Act. However, the reality was that much development was occurring outside of Melbourne that was not subject to statutory control. By the 1870s many areas such as Richmond and Collingwood expanded to overtake the population of Melbourne, and this was causing concern for the health, safety and amenity of building occupants due to the lax construction materials and techniques that would later be described as Melbourne's slums (Lewis, 1995). To combat this problem, the Melbourne Building Act was extended in 1870 to incorporate nearby areas such as Carlton (Lewis, 1995) to allow for the proper construction and amenity of buildings; however, it was not until the adoption of the Victorian Local Government Act of 1874 (Victorian Historical Acts, 1874) that provided for the creation of individual municipalities that areas could then pass local by-laws to regulate the construction and removal of buildings. In addition, other Victoria building regulations were gradually introduced to reduce fire risk, remove slums and improve

amenity. Such examples include the *Housing and Reclamation Act 1920* (Vic) and the *Victorian Slum Reclamation and Housing Act 1938* (Vic).

This process continued until 1945 when the Victorian government passed the *Uniform Building Regulations 1945* (UBR) that provided for the prescriptive nature of buildings by classifying structures from a Class I dwelling through to a class V building (the latter being an outbuilding). The UBR is the first documented requirement to provide for the maintenance of fire safety measures and features for commercial-style buildings, being the maintenance of exits. Commercial-style buildings in this context refers to all other buildings, being multi-storey residential units, offices, shops, factories, schools, hospitals, public halls, pubs and the like – essentially all other buildings that are not a single dwelling or outbuilding. Although amendments to the UBR continued at varying intervals, namely in 1959, 1961 and 1974, the next major regulation change was not until 1983 when the UBR was replaced with the Victorian Building Regulations that came under the Building Control Act of 1981 (State Library Victoria, 2019).

Prior to this, the UBR came under and was adopted through the *Local Government Act of 1958* (Vic). The 1983 version of the Victorian building regulations expanded the maintenance requirements for commercial-style buildings to a more prescriptive requirement encompassing a greater extent of fire safety features. This was the maintenance of fire and other safety measures to be maintained under part 5 of the regulations with the following albeit limited maintenance requirements of portable fire extinguishers, fire hose reels and sprinkler systems to be maintained to Australian Standard AS1851 and exit signs and emergency lighting to be maintained to Australian Standard AS2293 part 2 (State Library Victoria, 2022). All other safety equipment and fittings were required to be maintained to fulfil their purpose.

The next major shift in terms of maintenance in commercial-style buildings in Victoria came with the adoption of the *Building Act 1993* that referenced the newly adopted building regulations of 1994. The maintenance of buildings within these regulations were covered under part 11 that effectively had two distinct divisions: division 1 for buildings constructed after 1 July 1994 and division 2 for buildings constructed before 1 July 1994. This new provision provided a major stringency shift in prescriptive statutory maintenance for a building's fire safety systems and methodologies. Buildings constructed post 1 July 1994 (division 1 buildings) were now required to be not only be fit for purpose but also maintained to a level of frequency stipulated for the occupancy of the building to encompass a full range of active and passive fire safety systems. Division 2 buildings on the other hand remained on the previously adopted UBR that only requires a building's fire safety systems to be fit for purpose. A further shift from the adoption of the building regulations mandated local government regulators, for the first time, to administer and enforce the ongoing fire and life safety maintenance requirements of buildings (*Building Act 1993*, s. 212). These additional responsibilities necessitated

local government building departments to uphold compliance with the policy, as outlined in the building regulations, for all commercial-style buildings classified under the Building Code of Australia (BCA) 2 to 9 within their municipality (see Table 2-1 for descriptions of classifications). Figure 2-1 details the timeline of building regulation and fire safety maintenance changes.

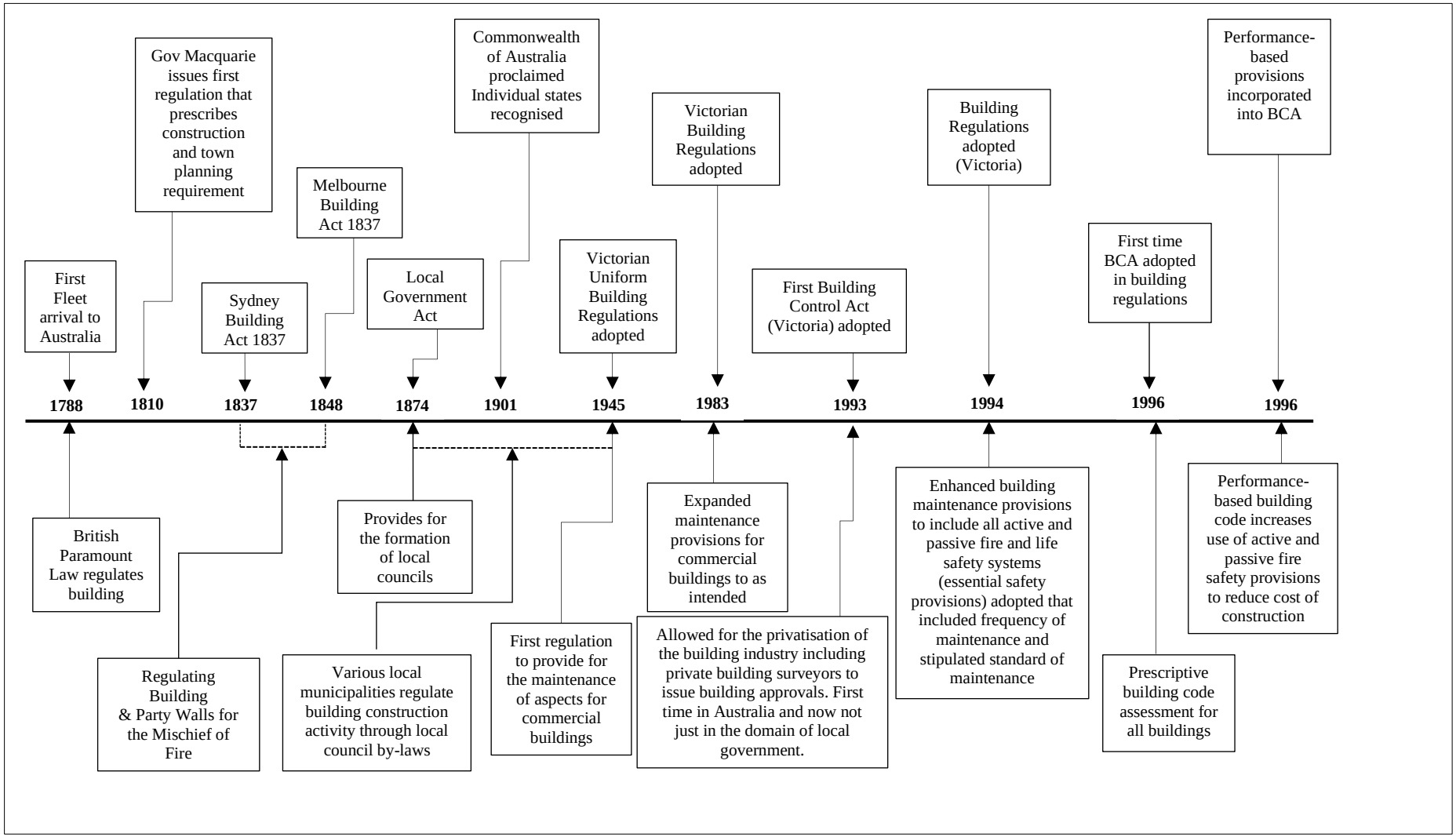


Figure 2-2: Timeline of Building Regulation and Fire Safety Maintenance Changes

Having discussed the origins of building policy in Australia generally, and Victoria specifically regarding fire safety maintenance, the next part of this chapter will explore the development of the BCA. This will detail the BCA's complexities utilising a fully performance-based building code that has shifted the paradigm to building owners to ensure building occupant and community safety through a complex prescriptive maintenance regime over the life of the building.

To further explain this interdependency between these two methodologies, the use of a fully performance-based building code for the design, approval and construction of buildings has allowed decisions in the design phase by developers and architects to increase active fire protection systems and decrease passive design elements in buildings (Barbaro & Marfella, 2019; Shergold & Weir, 2018) without input from other stakeholders such as building owners. This methodology in assessment reduces the actual initial construction costs for the developer and increases the costs for subsequent owners to maintain complex fire protection systems over the life of the building.

2.3 Background of the Building Code of Australia

As previously discussed, the Australian Constitution is silent regarding the safety, health and amenity of buildings; it is the responsibility of each state and territory to administer (Australian Building Codes Board, n.d.) with the exception of disability access, which is outside the scope of this thesis. As each state and territory has their own forms of enforcement and administrative provisions for the regulation of building and safety standards, this provides an inconsistent and confusing approach at best. This confusing, complex and inconsistent approach was recognised and acknowledged by state and territory governments back in 1965, which led to the formation of the Interstate Standing Committee on Uniform Building Regulations (ISCUBR), with the responsibility to draft a model technical code for building regulation for Australia (Meacham, 2009). This was later known as the Australian Model Uniform Building Code (AMUBC) and was released in the 1970s (Australian Building Codes Board, n.d.). However, many states and territories deviated from this code for their own local purposes and needs, as the majority of the states used local government to administer and interpret the building code and regulations. This deviation further led to a re-think of the code by the Local Government Ministerial Council in 1980 to find a truly national alternative building code for all states and territories to adopt. The Local Government Ministerial Council formed the Australian Building Regulations Coordinating Council (AUBRCC) to develop a nationalised code, and in 1988 the first edition of the Building Code of Australia (Australian Uniform Building Regulations Co-ordinating Council, 1990) was developed (Australian Building Codes Board, n.d.; Meacham, 2009). The BCA was progressively adopted by each state and territory throughout the 1990s; however, in the early 90s it was acknowledged by AUBRCC that inconsistency in the BCA administration and policies around Australia were providing less competitiveness, resulting in higher costs for building construction that were mainly due to the prescriptive nature and interpretation of the code that

discriminated against new products and technology. Therefore in 1994, there was an intergovernmental agreement signed by all states and territories to form the Australian Building Codes Board (ABCB) to develop and administer a nationalised and consistent BCA (Australian Building Codes Board, n.d.) . This agreement also acknowledged that building regulations should be performance based to allow for contemporary building techniques and products to be used that did not discriminate against a prescriptive approach and outdated building techniques and products. The ABCB adopted a nationalised and fully performance-based building code in 1997 (Productivity Commission, 2004). To further clarify the distinction of the BCA and the role of state and territory governments, the BCA is the technical component of the policy – that is, it sets the minimum required level for the design and construction of buildings – whereas the administrative provisions with respect to the maintenance of fire and life safety systems are a state and territory requirement through the implementation of various state-based Acts and regulations. Therefore, the nationalised BCA has not contributed to the maintenance of a building's fire and life safety systems by the owner in the post-construction phase of the building. Figure 2-2 details the formation of the BCA to the present day.

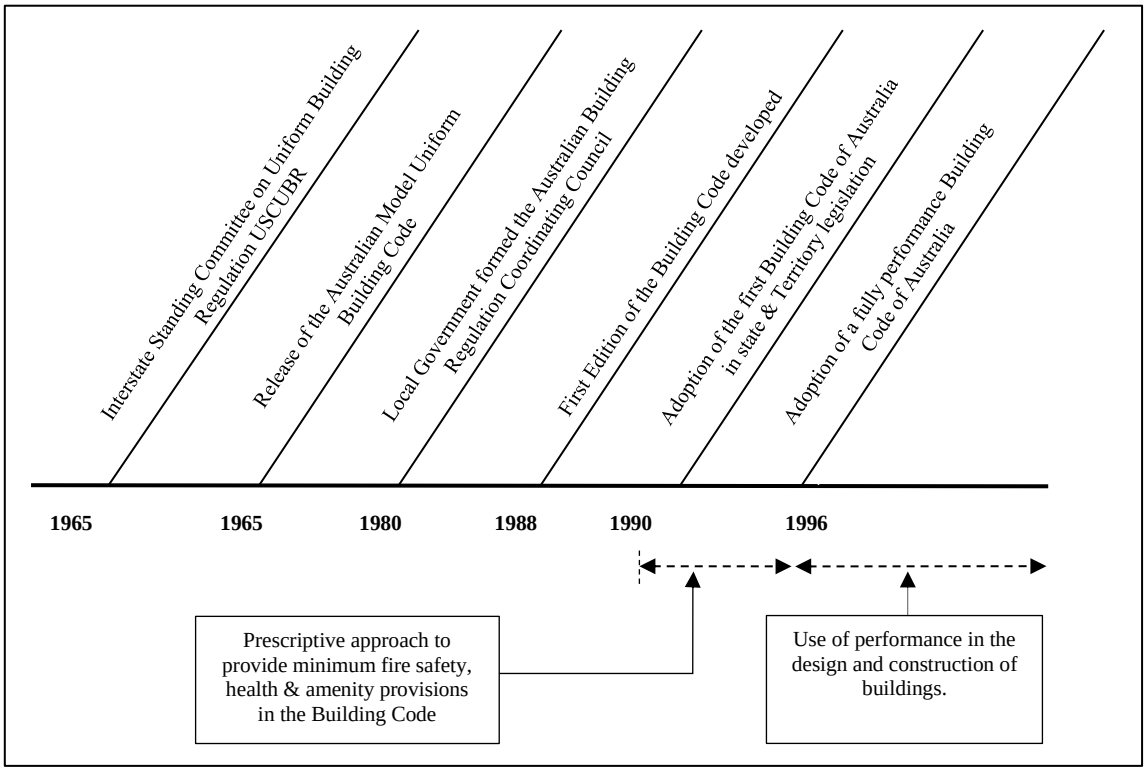


Figure 2-3: Timeline for Adoption of the BCA

2.4 Overview of the Structure of the Building Code of Australia

The BCA now comprises two volumes: volume 1 is for building classifications of 2 to 9 and specifies the design and construction requirements of multi-storey residential, commercial, industrial and public buildings; volume 2 is for building classifications 1 and 10 and specifies the design and construction of domestic-type buildings – that is, detached houses, sheds, garages, carports, swimming pools, fences and the like (Australian Building Codes Board, 2019a). Table 2-1 shows in detail the classes of buildings under the BCA.

Table 2-1: Classifications of Buildings in the BCA

Volume 1 of the BCA
Class 2: Buildings containing sole-occupancy units which are dwellings (e.g. apartments, blocks of flats)
Class 3: Backpacker accommodation, residential parts of hotels or motels, residential parts of schools, accommodation for the aged, disabled or children
Class 4: A dwelling in another class of building
Class 5: Offices for professional or commercial purposes
Class 6: Shops or other buildings for sale of goods by retail, including cafes, restaurants, milk bars, dining rooms, and bars
Class 7a: A car park
Class 7b: Buildings used for the storage or display of goods for sale by wholesale
Class 8: Laboratories or buildings for production or assembly of goods
Class 9a: A health care building
Class 9b: An assembly building including a trade workshop, laboratory, schools and the like
Class 9c: A residential care building
Volume 2 of the BCA
Class 1a: Single dwellings
Class 1b: Some boarding houses, guest houses or hostels
Class 10a: A non-habitable building including a private garage, carport and the like
Class 10b: A structure such as a fence, antenna retaining wall and the like
Class 10c: A private bushfire shelter

(Australian Building Codes Board, 2019a, 2019b)

Volume 1 and volume 2 of the BCA are the main referenced documents used for the technical design and construction of all buildings in Australia to ensure that they meet minimum levels of safety, amenity, accessibility and sustainability (National Construction Code Amendment 1, 2019). It is noted and acknowledged that the NCC Building Code of Australia is revised every three years, with major

changes in the structure including referenced documents planned at the time of writing this thesis. Therefore, the NCC Building Code of Australia 2019 has been referenced for this study.

When applying the performance provisions used in the BCA, compliance can be achieved in two ways. The first is via the 'deemed to satisfy' approach – that is, applying the prescriptive path of the code to meet the performance requirements – and the second is via a performance solution, or a combination of the two. A performance solution is where an assessment is made against the relevant performance criterion that demonstrates the proposed solution meets the equivalence of the performance requirement (Australian Building Codes Board, 2019c). Figure 2-3 shows the compliance structure of the BCA.

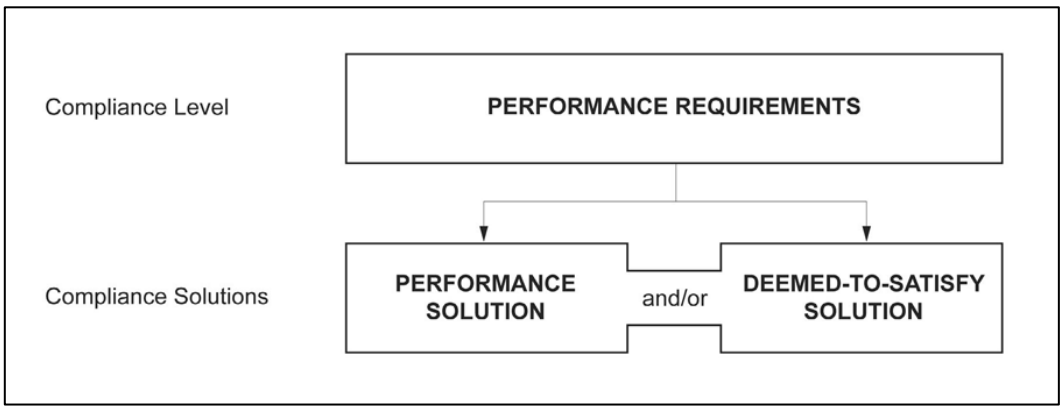


Figure 2-4: BCA Compliance Option Structure

(Australian Building Codes Board, 2019b)

The use of performance solutions to meet the performance requirement has however inadvertently increased the dependency on active and passive fire and life safety systems in multi-storey residential buildings. This dependency is placing a heavy reliance on the maintenance regimes of those systems to enable them to work as intended (Bukowski & Babrauskas, 1994). In addition to the installation of fire safety systems, they are also required to be maintained over the life of the building, and that places higher running costs for building owners (Wong & Xie, 2014). This was also highlighted as a weakness by the Productivity Commission (2004), which confirmed that this was an "*issue for multi-unit residential buildings where the developer can make savings by passing such costs on to the ultimate owners and occupiers of buildings*" (Productivity Commission, 2004, p. XXXII). These safety systems are known as either essential safety measures (ESM), essential safety systems, fire safety systems or life safety systems and include features as shown in Table 2-2.

Table 2-2: Extent of Essential Safety Systems

Air-handling systems (used for smoke hazard management)	Fire detection and alarm systems
Exit doors	Fire hydrants
Early warning systems	Fire-isolated stairs
Emergency lifts	Fire-rated materials
Emergency lighting	Fire windows
Emergency power supply	Mechanical ventilation (incorporate a cooling tower or hot or warm water system)
Emergency warning systems	Fire-isolated passageways and ramps
Exit signs	Paths of travel to exits
Fire control centres	Smoke alarms
Fire curtains and doors	Smoke control systems
Fire extinguishers	Sprinkler systems

(Victorian Building Authority, 2020)

These fire safety measures are subdivided into specific categories, each encompassing multiple components. These categories include building fire integrity, means of egress, exit and directional signs, emergency lighting, active firefighting services and equipment, air-handling systems, automatic fire detection and alarm systems, occupant warning systems, lifts, standby power supplies, building clearance and fire appliances, mechanical ventilation and hot or warm water cooling systems (Victorian Building Authority, 2020). For the full list of essential safety systems refer to Appendix B.

All these fire safety measures are required to be regularly maintained at predetermined levels and frequencies over the life of the given building (Productivity Commission, 2004), and this causes high running costs for building owners and companies alike (Horner et al., 1997). In addition, the policy for maintaining fire safety systems in Australia, being the administration and enforcement of the policy, rests with each state and territory. However, as previously mentioned, the inherent problem is the inconsistent and different approach of the policy by each state and territory regarding implementation, including the statutory maintenance provisions for buildings. This is confusing for property owners, the community and companies alike operating throughout Australia.

2.5 Australia's Performance-Based Building Code

There have been ongoing benefits of performance-based building codes with the introduction of the private sector providing building regulation enforcement (Meacham, 2001, 2010; Mumford, 2010; Van der Heijden, 2008; Wolski et al., 2000) including issuing building approvals by building surveyors/certifiers for the construction of buildings instead of by local or state government authorities. That debate in Australia essentially ended with the introduction of a performance-based building code in 1996 (Australian Building Codes Board, 2019c) that was adopted by the Commonwealth on 1 July 1997, with other states following suit. Table 2-3 shows the adoption by each state and territory of the Building Code of Australia 1996 that introduced 'performance' as a pathway to achieve compliance.

Table 2-3: Adoption Dates of the Building Code of Australia 1996

State / Territory / Administration	Performance-based BCA
Australian Capital Territory	1 July 1997
New South Wales	1 July 1997
Northern Territory	7 January 1998
Queensland	1 July 1997
South Australia	1 January 1998
Tasmania	1 July 1997
Victoria	1 August 1997
Western Australia	1 July 1997

(Australian Building Codes Board, 2019b)

A study completed in 2013 (Armstrong et al., 2017; The Centre for International Economics, 2013) found that the direct benefit from a performance-based building code was $1.1 billion, which essentially translated into cheaper ways of construction and use of cheaper building products. This study did not however anticipate the ongoing costs for end users to maintain a very complex fire safety system or strategy as a result of achieving compliance with performance-based designs installed within the building, which is the focus of this thesis.

There is an emerging trend around the world to move from a traditional prescriptive approach in policy to a performance-based one (Meacham, 2009; Nwadike et al., 2019; O'Brien, 2016; Spinardi, 2019; Van der Heijden & de Jong, 2009). The traditional prescriptive regulatory approach to regulate building control requires complete compliance with the policy without deviation whereas a performance-based approach provides for a series of statement of goals, functional statements and

performance provisions (Australian Building Codes Board, 2019c; Wolski et al., 2000) to achieve regulatory compliance. This means that compliance with community expectations, being the statement of goals, can be reviewed through the performance of building assessments and in products used in construction of those buildings (Productivity Commission, 2004, p. 20).

Community expectations in the formation of the NCC performance provisions were developed historically through previous prescriptive practices utilising interactions of acceptable solutions through regulation (Bukowski & Babrauskas, 1994; Meacham, 1996). When the Building Code was introduced in 1996, community expectations were met through the mandatory level via the previous acceptable prescriptive practices (Australian Building Codes Board, 2022). Community expectations within the performance-based regulatory approach for building codes also came from reducing regulatory burden, reducing costs to both industry and the general public and allowing for flexibility of design in emerging issues and innovative products while ensuring acceptable levels of risk to account for the welfare and safety of the building occupants (Meacham, 2009, 2016; Wolski et al., 2000). Providing minimum standards for the community for health and safety, including safety from fire and amenity, arguably refers to community standards, although these standards are historic (O'Brien, 2016, p. 21). Events such as major catastrophic fires necessitate re-thinking community expectations – by way of example, the Great Fire of London in 1666 (Robinson, 2011). Community consultation is now being used at all levels of governments including the ABCB in the formation of performance provisions to ensure that they continue to meet expectations. Figure 2-5 shows the compliance pathway in further detail, highlighting the objectives of the BCA and functional statements.

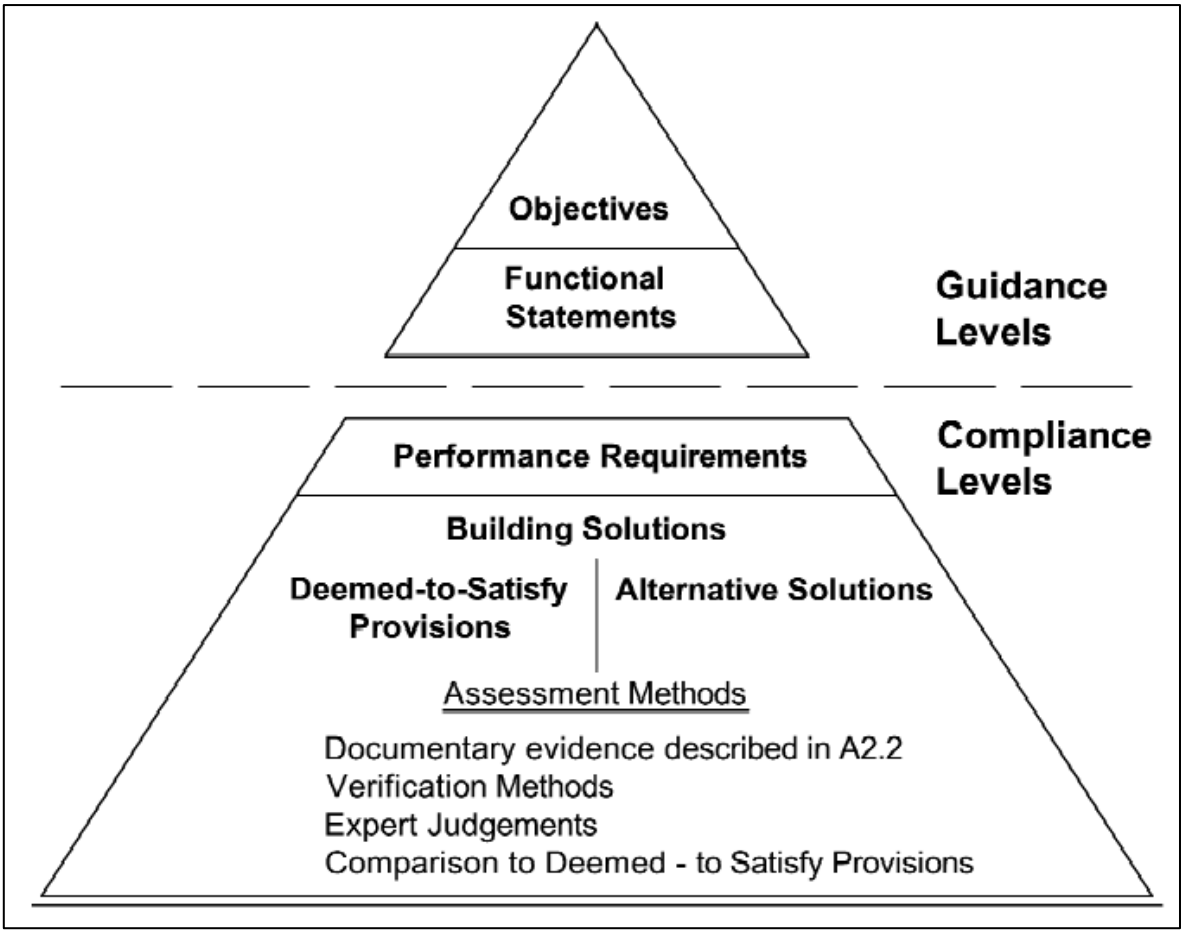


Figure 2-5: Compliance Pathways

(Armstrong et al., 2017)

The privatised and deregulated industry for building code assessment by private building surveyors/certifiers and fire engineers has allowed greater flexibility with other building professionals that has resulted in cost-effective and innovative building and construction solutions (Productivity Commission, 2004; The Centre for International Economics, 2013; Van der Heijden, 2008). This also provides greater flexibility in the use of performance-based building policy in the initial design process (Meacham, 2009); however, maintenance provisions have not been integrated into this policy and have largely been ignored in research by academics and governments alike. Consideration of the economic benefits of performance legislation has been restricted to the design and construction phases of buildings. No significant research has been identified by the author into the life cycle cost of ongoing maintenance of a building's fire and life safety systems, which is the focus of this thesis.

The ABCB suggests that only 50% of buildings realise the potential benefits of using alternative solutions (performance solutions) in the building approval and construction process (The Centre for International Economics, 2013, p. 32) to achieve compliance with alternative designs and to save money in construction costs. A survey of industry practitioners conducted as part of research into the

reform of building regulation by the Productivity Commission (2004, p. 55) found that 50% of respondents agreed that the use of performance-based regulation increases the maintenance costs of buildings. The estimated benefit from the construction industry to the Australian economy is approximately $1.1 billion a year, with the net benefit annually of $780 million attributed to the use of performance-based building codes (The Centre for International Economics, 2013, p. 5). This research has not accounted for the increased cost of maintaining these buildings when using a performance-based assessment, which can be in the vicinity of 50% to 80% of construction costs over the life of a building (Saghatforoush et al., 2011). This suggests that developers are using the performance-based design process to maximise private goods (profit) at the expense of public goods (safety).

Having discussed the history of building regulation and policy from the First Fleet to the current day and provided an overview of the technical building codes, the policy and details for maintaining multi-storey residential buildings incorporated into regulation in Victoria and NSW will now be discussed.

2.6 Victorian Requirement for Maintaining Buildings

In Victoria, the current administration function for the maintenance of passive and active fire and life safety systems, known in Victoria as essential safety measures (ESM), is contained within part 15 of the *Building Regulations 2018* (Vic). Part 15 specifies that all buildings having a BCA classification of 1b through to 9 are required to be maintained.

All buildings specified under the policy regardless of age are required to be maintained at predetermined intervals throughout the life of the building. All buildings that have been constructed, altered or extended after 1 July 1994 require either an occupancy permit or certificate of final inspection to be issued with a maintenance determination that specifies the element, frequency and standard to apply for maintaining the building's fire and safety provisions. For buildings that were constructed prior to 1 July 1994, the building's fire and safety provisions must be maintained to fulfil their purpose as the provisions of the 1983 version of the Victorian Building Regulations apply (Victorian Building Authority, 2021).

It is the responsibility of each local government authority through the municipal building surveyor and/or the chief officer of the relevant fire authority to enforce the maintenance provisions of all relevant buildings under section 212 of the *Building Act 1993* (Vic).

Buildings that are subject to ESM are divided into three categories depending on when they were constructed, altered or extended. These are:

- buildings built after 1 May 2005

- buildings built between 1 July 1994 and 1 May 2004
- buildings built prior to 1 July 1994.

(Victorian Building Authority, n.d.)

These regulations require the building owner to maintain their essential services for the building throughout the year and self-regulate the policy under part 15 of the *Building Regulations 2018* (Vic). Self-regulate in this instance requires the owner to take full responsibility for the implementation of the policy, with minimal oversight by the regulator. Therefore, building owners are required to complete the appropriate testing mechanisms, including the completion of maintenance logbooks and a yearly self-certification process, a mandated form stating that all ESM have been maintained throughout the preceding year. These maintenance checks, logbooks and the self-certification must be available for display or viewing by the relevant local government authority through the municipal building surveyor and/or the chief officer of the relevant fire authority (*Building Regulations 2018* Vic).

The fines applied for noncompliance under part 15 of the *Building Regulations 2018* (Vic) are summarised in Table 2-4.

Table 2-4: Implications for Consumer Noncompliance

Reference	Description of Offence	Penalty Units
Reg. 216	Owner must comply with maintenance determination.	20
Reg. 218	Relevant building surveyor must prepare or update maintenance schedule for an existing building or place of public entertainment.	10
Reg. 223(1)	Owner must prepare annual ESM report within 28 days before each anniversary of the relevant anniversary date.	20
Reg. 223(2)	Owner must prepare annual ESM report within 28 days before 13 June 2018 and each anniversary of that date for buildings constructed before 1 July 1994.	20
Reg. 225	Records relating to ESM must be made available.	20
Reg. 226	Maintenance responsibility of owner of building or place of public entertainment to ensure ESM are maintained to fill their purpose.	20
Reg. 227	ESM not to be removed from approved locations.	20
Reg. 228	Maintenance of exits and paths of travel by occupiers of buildings or places of public entertainment.	20

Source: *Building Regulations 2018* (Vic)

There are no mandatory reporting provisions requiring a building owner to submit to any authority that the building's fire safety systems have been maintained for the preceding year to confirm that

compliance with the policy has been achieved. The policy is required to be maintained by building owners with no or minimal oversight by local authorities, including annual certification on a yearly basis that all essential fire and life safety systems have been maintained. The extent of compliance with the policy for maintaining multi-storey residential buildings is unknown in Victoria, as there are no mandatory reporting requirements that they have been maintained or verified.

2.7 New South Wales Requirement for Maintaining Buildings

In NSW, passive and active fire and life safety systems are referred to 'essential fire safety measures and required to be maintained and be fit for purpose. The governing provisions are contained within the *Environment Planning and Assessment Act 1979* (NSW) and the *Environment Planning and Assessment Regulation 2000*. Specifically, the essential fire safety systems are referenced within *Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021* (NSW).

An annual fire safety statement is required to be completed and submitted by the owner of a building that has a BCA classification of 1b, 2 through to 9. It is only buildings that are classified as being a BCA Class 1b, 2 to 9 that have been the subject of a building approval or fire safety notice by the local council after 1 July 1988, that are required to comply with the policy (Department of Planning and Environment, 2023). The annual fire safety statement must be provided to the local authority and the NSW Fire & Rescue Service in addition to having it displayed in a prominent position in the building . There appears to be a gap in the provisions for buildings constructed prior to 1 July 1988 that have not been subject to a building approval or a fire safety notice, as there are no annual reporting and compliance requirements.

Recently the NSW government have created a competent fire safety practitioner for two areas, the first is for the design of fire safety systems and the second is for carrying out of maintenance work on fire safety systems (Department of Fair Trading NSW Government, 2023). Only qualified competent fire safety practitioners are permitted to carry out certain maintenance requirements for the essential fire safety systems. This new requirement also requires that all fire safety statements must be issued by competent fire safety practitioners thereby requiring building owners when they submit their annual fire safety statements, to require it be completed by a competent fire safety practitioner.

The fines applied for noncompliance of essential fire safety measures are contained within the *Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021* (NSW) regarding maintenance and reporting requirements only, are summarised in Table 2-5.

Table 2-5: Implications for Consumer Noncompliance

Clause	Individual Penalty Units	Corporation Penalty Unit
Clause78 Fire safety schedules (2) A person must— (a) issue a schedule (a ***fire safety schedule***)— (i) in the approved form, and (ii) containing the matters specified in section 79, and (b) ensure the requirements of this section relating to the fire safety schedule are complied with.	150	300
Clause 80 Providing fire safety schedules and fire safety certificates after fire safety order is given (2) A person to whom a fire safety order is given in relation to a building must, within the time specified in the order, give a copy of the final fire safety certificate for the building to (a) the person who gave the fire safety order, and (b) if the person who gave the fire safety order was not the council—the council.	300	600
Clause 81 Essential fire safety measures to be maintained (1) The owner of a building must maintain each essential fire safety measure for the building— (a) for an essential fire safety measure specified in a fire safety schedule—to a standard no less than that specified in the schedule, or (b) for an essential fire safety measure applicable to the building but not specified in the fire safety schedule (an ***original measure***)—to a standard no less than that to which the measure was originally designed and implemented.	300	600
Clause 84 Issue of fire safety certificates (1) A person must not issue a fire safety certificate unless the assessments required for the certificate have been carried out within the previous 3 months. (3) The person who carries out an assessment must— (a) inspect and verify the performance of each essential fire safety measure being assessed, and (b) test the operation of equipment relevant to the essential fire safety measure being assessed that—	150	300

Clause	Individual Penalty Units	Corporation Penalty Unit
(i) is specified in the current fire safety schedule for the building, and (ii) has not previously been tested in an assessment because it is newly installed.		
85 Fire safety certificate to be given to Fire Commissioner and building practitioner and displayed in building (1) As soon as practicable after a fire safety certificate is issued for a building, the owner of the building must—		
(a) give a copy of the certificate and a copy of the current fire safety schedule to the Fire Commissioner, and	100	200
(a1) give a copy of the certificate to a building practitioner to whom the owner is required to give notice, under the Design and Building Practitioners Act 2020, section 16, of the owner's intention to apply for an occupation certificate, and required to give notice, under the Design and Building Practitioners Act 2020,		
section 16, of the owner's intention to apply for an occupation certificate, and	150	300
(b) ensure a copy of the certificate and a copy of the current fire safety schedule are prominently displayed in the building.		
86 Information to be included in fire safety certificates	150	300
(1) A person must not issue a fire safety certificate for a building or part of a building unless the certificate— (a) is in the approved form, and (b) contains the following information— (i) the name and address of the owner of the building, (ii) a description of the building, including the address, (iii) a list of each essential fire safety measure in the building and the minimum standard of performance specified in the relevant fire safety schedule for each measure, (iv) the date on which the essential fire safety measures were assessed, (v) whether the certificate is a final or interim fire safety certificate, (vi) a statement to the effect referred to in section 83(1)(b) for a final fire safety certificate or section 83(2)(b) for an interim fire safety certificate,		

Clause	Individual Penalty Units	Corporation Penalty Unit
(vii) the date on which the certificate is issued, (viii) the full name, business address, telephone number and accreditation number of each accredited practitioner (fire safety) who carried out an assessment under section 84(1). (3) A person must not issue a fire safety certificate for a building or part of a building unless the certificate is accompanied by a fire safety schedule for the building or part of the building.		
88 Annual fire safety statement (4) The person who carries out the assessment referred to in subsection (1)(a) must inspect and verify the performance of each essential fire safety measure being assessed.	150	300
89 Duties of building owners in relation to annual fire safety statements (1) The owner of a building to which an essential fire safety measure applies must give the council an annual fire safety statement for the building. (4) As soon as practicable after an annual fire safety statement is issued for a building, the owner of the building must— (b) ensure a copy of the statement and a copy of the current fire safety schedule are prominently displayed in the building.	400 55	800
90 Supplementary fire safety statement (4) The person who carries out the assessment must inspect and verify the performance of each fire safety measure being assessed.	150	300
91 Duties of building owners in relation to supplementary fire safety statements (1)If a critical fire safety measure is specified in the fire safety schedule for a building, the owner of the building must ensure the council is given a supplementary fire safety statement for the measure in accordance with this section. (4) As soon as practicable after issuing a supplementary fire safety statement, the owner of the building must— (b) ensure a copy of the statement and a copy of the current fire safety schedule are prominently displayed in the building.	400 55	800 55

Clause	Individual Penalty Units	Corporation Penalty Unit
92 Information to be included in fire safety statements	150	300
(1) A person must not issue an annual or supplementary fire safety statement for a building unless the statement—		
(a) is in the approved form, and		
(b) contains the following information—		
(i) the name and address of the owner of the building,		
(ii) a description of the building, including the address,		
(iii) for an annual fire safety statement—a list of each essential fire safety measure for the building and the minimum standard of performance for each measure,		
(iv) for a supplementary fire safety statement—a list of each critical fire safety measure for the building and the minimum standard of performance specified in the relevant fire safety schedule for each measure,		
(v) the date on which the essential and critical fire safety measures were assessed,		
(vi) the date on which the building was inspected,		
(vii) whether the statement is an annual or supplementary statement,		
(viii) a statement to the effect referred to in section 88(1) for an annual statement or section 90(1) for a supplementary statement,		
(ix) the date on which the statement is issued,		
(x) the name, address and telephone number of the person who issued the statement,		
(xi) the name, address and telephone number of the accredited practitioner (fire safety) who assessed the fire safety measures for the statement.		
(2) A person must not issue a fire safety statement for a building unless the statement is accompanied by a fire safety schedule for the building.		

Source*: Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021* (NSW)

2.8 Commonwealth Recommendations for Maintaining Buildings

Although building regulation is the responsibility of each state the territory, it was a key recommendation of the *Building Confidence Report*, commissioned by the Building Ministers Forum (2018), "*that each jurisdiction requires that there be a comprehensive building manual for Commercial buildings that should be lodged with the building owners and made available to successive purchasers of the buildings*" (Shergold & Weir, 2018, p. 35). In addition, this report also acknowledged that modern building practices for multi-storey residential apartment buildings are mostly completed through a design and construct process leaving the main stakeholder, being the owner, to deal with the ongoing maintenance over the life of the building of complex fire safety systems that have been installed to reduce construction costs by the developer (Shergold & Weir, 2018).

In response to the *Building Confidence Report* recommendations, the ABCB developed a document titled *Building Manuals: Model Guidance*. The model guidance for building manuals recommends six key principles for the management of maintaining a building's fire and life safety systems:

- Principle 1 – Minimum building manual information
- Principle 2 – Responsibility for compiling building manual information
- Principle 3 – Accuracy and completeness
- Principle 4 – Access to building manual information
- Principle 5 – Auditing and enforcement
- Principle 6 – Information and education

(Australian Building Codes Board, 2021a)

Compounding the issue for the development of mandatory building manuals and maintenance generally is the increase in complexity in the contemporary and bespoke active fire safety systems now being installed in multi-storey buildings that require highly specialised skilled maintenance personnel to ensure ongoing compliance. Unfortunately, some systems that are being installed by developers that allow them to reduce construction costs of buildings are also outside the scope, expertise and technicalities of building owners and maintenance managers (Carter, 2019). To combat this phenomenon some state and territory governments are now mandating that certain maintenance personnel that deal with complex active fire and life safety systems be suitably trained, accredited and carry appropriate professional indemnity insurance. As previously mentioned, NSW now requires certain fire safety maintenance practitioners to be accredited and undertake specialised training (Fire Protection Association Australia, 2020; New South Wales Government Department of Fair Trading, 2021) and the Victorian Building Authority (2021) requires certain plumbing practitioners to be trained and be competent to undertake certain maintenance functions for wet fire safety systems in

commercial buildings. These initiatives were a key recommendations by the ABCB in response to the *Building Confidence Report* (Shergold & Weir, 2018) that each state and territory government requires the registration of fire safety practitioners (Australian Building Codes Board, 2021a).

The ABCB have also produced a non-mandatory handbook to guide building practitioners, design professionals and the general community on the requirements for maintaining safety measures and equipment in existing buildings (Australian Building Codes Board, 2015).

Having discussed the contemporary issues facing ongoing maintenance and policy requirements for multi-storey residential apartment buildings in NSW and Victoria, the next part of this chapter will explore the exponential growth of multi-storey residential buildings in Australia. A detailed analysis will describe the growth of multi-storey residential apartment buildings to provide context to the problem identified in the design and policy that shifts responsibility for the costs of safety in the initial construction phase from the developer to the owner. The main literature regarding the policy will be explored in the context for this study in Chapter 3.

2.9 The Extent of Multi-Storey Residential Buildings in Australia

The first recorded multi-storey residential building was constructed in Australia around 1900, with the first high-rise residential tower being the Astor, in Sydney, in 1920 (Butler-Bowdon, 2009), and the increase in apartment buildings has grown exponentially from the early 1990s. High-rise apartment building began essentially in our major cities in Melbourne and Sydney on its current day trajectory following the Second World War. This was essentially due to procurement of design expertise from North America and new forms of construction materials and technologies such as lifts, air-conditioning and glass facades that altered the landscapes forever in our capital cities (Barbaro & Marfella, 2019). The turn of the century saw a shift away from owner-built projects, with insurance companies sharing the cost of development and procurement for long-term ownership arrangements to tall buildings being used as a commodity to be bought and sold in an increasing higher speculative market. Planning ordinances then promoted mixed-use development requirements for these buildings, adding a mix of retail, office and accommodation requirements and creating high density vertical development (Marfella, 2016). Essentially the super profits obtained during these times led to increased numbers of multi-storey residential apartment towers in our two major capital cities (Barbaro & Marfella, 2019).

According to Shergold and Weir (2018) new apartments in multi-storey residential dwellings in Australia have tripled, from 30,000 in 2007 to 90,000 in 2015, and from 1991, one in five (18%) of all Australians lived in apartments. However, this increased to 38% in 2016 with 1,214,372 apartments being occupied (Australian Bureau of Statistics, 2020). Interestingly, the 2021 census also shows that

over 2.5 million people (2,620,903) or 10.3% of us now live in apartments, up from the 2016 census of 1,214,372 (Australian Bureau of Statistics, 2021). Therefore, the increase in high-rise apartment complexes being constructed post 1996 using a performance-based building code has inadvertently increased the reliance on the maintenance and ability of life and fire safety systems to operate as intended.

Multi-storey residential buildings are generally completed by developers, who engage builders to construct these buildings on a design and construct contract basis (Shergold & Weir, 2018). This allows the builder to lower construction costs by utilising performance-based solutions for cheaper construction methodologies and products (Productivity Commission, 2004, p. 71). However, increasing performance solutions as a compliance mechanism increases the reliance of active life and fire safety systems and processes (Holmes et al., 2011; Lombard & O'Malley, 2014; Shergold & Weir, 2018; The Centre for International Economics, 2013). The fire safety risks associated with multi-storey construction were identified as early as 1912 with the introduction of an Act that limited building heights in Sydney to 150 feet, as this was the maximum range of firefighting appliances (Logan, 1987, p. 11).

The extent of apartment living in Australia has produced a range of challenges, including higher densities that require an increasing role of governance arrangements (Easthope & Randolph, 2009). Strata-type developments require the appointment of managers that have the right to carry out maintenance and other tasks for the ongoing usability of buildings on behalf of the building owners. Ownership obligations may not however be fully understood when unsuspecting owners purchase off the plan without input or knowledge into the design considerations or quality control mechanisms (Productivity Commission, 2004; Shergold & Weir, 2018; The Centre for International Economics, 2013). The legal obligation to maintain these systems or the consequences that noncompliance can bring may also never be fully realised by building owners (Bell, 2017; Productivity Commission, 2004; Shergold & Weir, 2018). This has placed considerable risk on building owners, residents and community safety throughout Australia and demonstrates the need for further research in this area.

As demonstrated there has been a substantial increase in multi-storey residential apartment living in Australia. This increase has occurred utilising a fully performance-based building code for the design, assessment and construction phase with little or minimal input from unsuspecting owners who will need to maintain those installed safety systems throughout the life of the building.

Moreover, the degree to which these buildings are genuinely adhering to maintenance requirements remains uncertain, posing additional risks to building owners, the community and insurance providers.

2.10 Implications of the Policy in Australia

Of the 1,214,372 occupied apartments in Australia in 2016, nearly half (47%) were in NSW, followed by 23% in Victoria and 17% in Queensland (Australian Bureau of Statistics, 2020). NSW and Victoria have different statutory maintenance management requirements, as do other states, as shown in Table 2-6.

Table 2-6: Different States Utilising Performance-Based Building Codes and their Respective Maintenance Requirements

State/Territory	Requirement for Ongoing Maintenance	Mandatory Reporting Requirements to Authorities	Fire Safety Maintenance Requirements	Annual Reporting Commitments	Building Owner Requirement for Maintenance	Building Occupier Requitement for Maintenance
Victoria	✓	✗	✓	✓	✓	✗
New South Wales	✓	✓	✓	✓	✓	✗
Queensland	✓	✗	✓	✓	✓	✗
Northern Territory	✓	✗	✓	✓	✓	✗
Western Australia	✓	✗	✓	✓	✓	✗
South Australia	✓	✓	✓	✓	✓	✗
Tasmania	✓	✗	✓	✓	✗	✓
Australian Capital Territory	✓	✗	✓	✓	✓	✗

Table 2-6 shows that although each state and territory use the performance-based building code for the design and construction of buildings, ongoing maintenance provisions have largely been ignored. The two states with the majority of multi-storey residential apartment buildings, NSW and Victoria, have different reporting requirements and methodologies in management. NSW has essentially a mandatory reporting requirement for all commercial-style buildings constructed after 1988, whereas Victoria has a non-mandatory self-management requirement that clearly puts the onus on each building owner to comply with their respective fire and life safety maintenance requirements. As these two systems are representative of the different styles and cover the majority of multi-storey residential apartment buildings in Australia, NSW and Victoria have been selected for this study.

2.11 Summary

This chapter provided a historical context to the creation of building regulations and policies in Australia and identified the first regulation that stipulated certain commercial-style buildings be maintained post construction. The chapter then focused on Victoria as a case example, as all states and territories have their own and different forms of building policy and regulation that, at its core, is a performance-based building code. The timelines of policy and regulation changes through to adoption of the fully performance-based building code demonstrated the increasing complexity of the reliance on performance as a compliance pathway for the design and construction of buildings, and with this the exponential increase of people living in multi-storey residential apartments.

It has been demonstrated that the increase in performance as a compliance pathway for the construction and design of multi-storey residential buildings has increased the reliance of fire and life safety systems to enable the lawful and safe occupation of those buildings (Nwadike & Wilkinson, 2020). This increase has only occurred in the latter part of the 19th century and has grown exponentially since the adoption of a fully performance-based building code in a postmodern era (Bell, 2017; Denman et al., 2024). To partially combat the rise in maintaining a tall building post occupancy, noting the complexity of multi-storey apartment buildings being constructed, the Australian government through the Building Ministers Forum (2018) commissioned the *Building Confidence Report*, authored by Professor Peter Shergold and Bronwyn Weir (Department of Industry Science and Resources, 2018). This report highlighted the added complexity due to modern, bespoke building techniques using a performance-based building code for the design and construction of multi-storey residential apartment buildings and the need for building manuals for subsequent owners to detail the complex fire safety systems installed in the building and subsequent maintenance regimes for the building (Shergold & Weir, 2018). In addition, a further recommendation (recommendation 1) of the Building Confidence Report was for professionally training fire safety design personnel to undertake maintenance on those buildings (Shergold & Weir, 2018).

This chapter then moved on to discuss the commencement of the first multi-storey residential apartment buildings and the boom in construction from the post-war era to the current situation. It was confirmed that the extent of apartment buildings has provided a number of challenges, including increased governance requirements for building owners and regulators to ensure community safety is being maintained in a deregulated building enforcement era (Bell, 2017, Denman et al., 2024) where, according to the 2021 census, over 2.5 million people or 10.3% of Australia's population now occupy apartments (Australian Bureau of Statistics, 2021). This increase is exacerbated in NSW, where higher density living is being experienced and nearly half or 47% of apartments are located, with Victoria coming in second at 23% (Australian Bureau of Statistics, 2022).

The next chapter will review the existing literature in this area and the reliance on maintenance by unsuspecting building owners. The chapter will then explore an alternative mechanism of compliance to ensure maintenance of multi-storey residential buildings subject to policy and compliance mechanisms.

Chapter 3: Literature Review

3.1 Introduction

This chapter will explore the policy for maintaining a building post construction with respect to fire safety systems and will detail the issues and identify the problem. The chapter begins with a detailed description of building policy reform in Australia (section 3.2). The policy for maintaining a building's fire and life safety systems is then discussed (section 3.2.1) with the added context to provide an understanding of privatised building processes and regulatory approaches (section 3.2.2). The chapter then moves on to the reliance this has from a building owner's perspective (section 3.2.3) and considers the main literature in building maintenance (section 3.2.4), including the reliance that these maintenance systems have on the owner (section 3.2.5). It then draws upon international policy and reflects on specific legislative requirements for ongoing maintenance (section 3.2.6). Community expectations are then discussed (section 3.2.6) within the context of maintaining existing buildings in a post-construction environment along with the specific role the regulator must manage the policy (section 3.2.8).

The chapter then explores the theory of planned behaviour (TPB) and how this theory may be utilised as a compliance pathway for the policy (section 3.3). The final part of this chapter explores the literature gap (section 3.4) and identifies the stakeholders for this study (section 3.4.1).

3.2 Reform of Building Policy in Australia

In the early 1990s, the Australian Building Regulations Coordinating Council (AUBRCC) set out the parameters and objectives for the formation of a model building act that could be implemented in each state and territory (International Finance Corporation World Bank Multilateral Investment Guarantee Agency, 2013; Productivity Commission, 2004). The Model Building Act aimed to introduce several novel reforms regarding building regulation and control in Australia:

- "*To develop the world's best practice model of building regulation*
- *To reform construction liability laws/regimes*
- *To establish the most efficient appeal mechanisms and building control mechanism for expeditious resolution of building permit matters.*
- *To establish a privatised alternative to local government to the issuing of building permit – private certification*"

(Lovegrove, 2021)

Although many of the aspects of the Model Building Act were introduced into each state and territory legislative system, not all states comprehensively adopted all recommendations. Fundamental however to the Model Building Act was the introduction of private sector involvement in the approval and certification of buildings. This allowed private building surveyors to issue approvals to buildings, albeit with some states, namely Western Australia, Tasmania and South Australia, using local government to issue building and occupancy approvals with the private sector undertaking the certification and inspection functions. However, according to Barbaro and Marfella (2019) the Model Building Act had embedded safeguards into it by allowing private certification functions and approvals, namely auditing of private building surveyors and other practitioners. The Model Building Act was intended to ensure adequate enforcement and monitoring regimes were undertaken by the regulator, while at the same time the private sector would ensure that they acted in the public interest to protect the community and enhance public safety. In essence, private building surveyors would become a statutory authority and regulator to administer the building provisions under the terms of their appointment to certify and issue building approvals.

The first state to adopt a privatised approach to building regulation enforcement was the Northern Territory. The Northern Territory system allowed for a fully privatised approval system that did not require any local authority involvement (Northern Territory Government, 2020) along with other reform areas such as compulsory registration of building practitioners, professional indemnity insurance requirements and dispute resolution systems (Barbaro & Marfella, 2019; Lovegrove, 2021). Although many aspects of the Model Building Act of 1991 were not adopted throughout Australia, two key components that have been adopted by all states and territories are the performance-based building code and allowing private building certification functions (Productivity Commission, 2004) with the last remaining state, Western Australia, allowing the private sector to fulfil building enforcement through private certification of buildings (Bazen, 2011; Department of Mines Industry Regulation and Safety, 2019). Table 3-1 details the adoption dates of private certification and enforcement throughout the states and territories.

Table 3-1: Adoption of Private Certification in Australia

State / Territory / Administration	Privatised Building Process
Australian Capital Territory	1999
New South Wales	1998
Northern Territory	1993
Queensland	1998
South Australia	1993
Tasmania	2004
Victoria	1993
Western Australia	2011

Source: (Bazen, 2011; Productivity Commission, 2004)

A report commissioned by the World Bank (2013) found that there was a lack of government monitoring of the private sector in the approvals and certification functions and that they failed to protect the public and community safety through robust monitoring schemes for the assessment of competence of private building surveyors, with no review process. Similar findings were also experienced in Victoria, where a report completed by the Auditor-General found that the Building Commission at the time were unable to guarantee or to satisfy that the privatised building permit system was working effectively and did not have the necessary safeguards in place to ensure that privatised building surveyors were enforcing the Building Act or regulations to protect community safety (Victorian Auditor-General, 2011). Essentially there were no state or territory regulators that introduced mandatory auditing of building surveyors, which was a key component of the Model Building Act of 1991 to allow for private sector involvement in the certification and approval functions of buildings. Instead the states and territories adopted a complaints-based system (Barbaro & Marfella, 2019, p. 372).

A further problem facing the building regulatory regime nationally was the adoption of the performance-based building code in that when the Model Building Act was initially developed, it was not envisaged that this would also incorporate a performance-based approach to building regulation (Barbaro & Marfella, 2019). With minimal government or regulatory oversight and lack of consistency in the implementation of the Model Building Act throughout the state and territory governments, the use of performance solutions to solve novel building problems for bespoke design and construction of buildings exacerbated the problem, as there was a lack of expertise and consistency in the assessment process.

With the private sector involvement in approval and certification of buildings, and the problems encountered, the NSW government initiated a further reform process for the design, approval and

construction of buildings. This was essentially instigated following the cladding crisis for multi-storey apartment buildings in Australia and major issues with high-rise apartment buildings in NSW (Barbaro & Marfella, 2019) such as the Opal Towers in Olympic Park (Hoffman et al., 2019) and the Mascot Towers' structural cracking issues (Malone, 2021). The NSW government endeavoured to commence a reform process for the design and construction of multi-storey residential apartments and introduced two new Acts in an attempt to resolve the issues of defective building work. The first is the *Residential Apartment Buildings (Compliance and Enforcement Powers) Act 2020* (NSW) that allows the NSW Building Commission and authorised officers to review Class 2 buildings and undertake enforcement action against defective building work and the second is the *Design and Building Practitioners Act 2020* (NSW) that introduced a two-tiered registration scheme for practitioners working on multi-storey residential apartment buildings. This Act essentially compels building designers and builders to ensure that the building work complies with the building code (Department of Fair Trading NSW Government, 2020). The NSW reforms outlined in 2020 resulted from the acknowledgment of systematic regulatory failures as demonstrated by the Opal and Mascot tower catastrophes (Hoffman et al., 2019) and showed that the performance-based building code for the design and construction of multi-storey buildings required specialist expertise to ensure that buildings complied with minimum building safety standards (Crommelin et al., 2021).

3.2.1 The Policy for Maintaining Building Fire and Safety Systems

The policy in Australia for maintaining multi-storey residential buildings is similar in each state and territory, despite different and inconsistent approaches administering building control. This is mainly due to a nationally consistent construction code – the Building Code of Australia, volumes 1 and 2 – that all buildings regardless of height, size or use are designed and constructed under. Several different forms of building policy (O'Brien, 2016; Van der Heijden, 2008), including the maintenance of a building's fire and life safety system, create a confusing situation for property owners, owners' corporations and companies operating in Australia (Better Regulation, 2023; NSW Government & Strata Community Association, 2021). The technical literature for statutory maintenance management for multi-storey residential buildings is not very extensive (Van der Heijden & de Jong, 2009), and there also appears to be minimal empirical evidence regarding the influence of statutory maintenance and commercial building ownership obligations (Productivity Commission, 2004; Shergold & Weir, 2018). Australian Standard AS1851 – 2021 Routine Service of Fire Protection Systems is the standardised technical benchmark that specifies the requirements for the maintenance of buildings. This standard is referenced in the maintenance provisions in NSW and Victoria as the technical document used to determine the requirements for a building's fire and life safety systems (Construct NSW, 2021; New South Wales Government Department of Fair Trading, 2023; Victorian Building Authority, 2019, 2020, 2023).

Major catastrophic events such as the Childers hostel fire that killed 15 backpackers on 23 June 2000 and the Kew Cottages fire that killed nine intellectually disabled residents on 8 April 1996 highlight the inability of existing code structures and policy to deal with emerging risks (O'Brien, 2016, p. 116). This reactive nature of code response was demonstrated in the wake of the Childers fire, as the government introduced a specific development code to improve fire safety in budget accommodation buildings. This is also true for a building's ongoing maintenance program post construction. Other major incidents involving multi-storey residential buildings, such as the Lacrosse fire in Docklands on 25 November 2014 (Badrock, 2016; Giuseppe, 2015), the Neo 200 fire in Spencer Street, Melbourne, on 4 February 2019 (Carter, 2019) and the Brunswick rooming house fire on 1 October 2006 (White, 2009) in Victoria. These events also highlight the inability of existing policy and code structures to deal with emerging risks, being the necessity of maintaining active and passive fire safety systems to be fit for purpose and operational when required. When installed active and passive systems become too complex for specialist maintenance companies to maintain, and too complex for building owners to understand, and are too reliant on early evacuation, this can lead to loss of life (Carter, 2019). Some argued that there was a lack of effective maintenance for those buildings, and the system responses in these fires were more good luck than good management such that further loss of life did not occur (Carter, 2019; White, 2009). From research conducted as part of this thesis, statutory maintenance provisions for multi-storey residential buildings appears to be an area that requires further research to inform effective regulatory responses.

The combustible cladding crisis that engulfed Australia highlights the need to ensure that buildings remain safe and compliant (Oswald et al., 2021; van der Pump & Scheepbouwer, 2023). Some argue that material complexity, encouragement of material substitution to less expensive materials and minimal onsite mandatory inspection regimes contributed to consumer harm to multi-storey residential apartment building safety (Cook & Taylor, 2022). While there are many factors that contribute to occupant and consumer safety, the Neo 200 fire and the Docklands fire demonstrate the lack of maintenance that resulted in increased consumer and occupant risks (Badrock, 2016; Carter, 2019; Giuseppe, 2015; Stephens, 2019).

At its core, the BCA does not rate protection of buildings as a high priority; instead, it has an emphasis on life safety (Productivity Commission, 2004, p. 106). The assessment methodology under the BCA does not require protection of property or buildings, but rather the emphasis is on occupant safety through early evacuation. The effectiveness of this methodology is reliant on adequate and ongoing maintenance and servicing of fire and life safety systems in those buildings and may not meet owner and community expectations, insurance company requirements (Productivity Commission, 2004, p. 173; Shergold & Weir, 2018) and fire authority needs (Badrock, 2016; Carter, 2019).

The Productivity Commission (2004) acknowledged that there are many accidental fires in commercial-type buildings in Australia, and these significant fires are predominantly caused by lack of maintenance. Although there is a relative paucity of research in this area, a study by Lind and Muyingo (2012) found that property managers and businesses develop three- to five-year maintenance plans; however, they usually are only adhered to for approximately three months. This inability to manage buildings can impact on the reliability of the safety systems installed as well as lease exposure for businesses and commercial property owners. Lind and Muyingo (2012) argue that it is not rational for businesses to plan for maintenance; rather they should review their practices with an understanding that in an uncertain world, society will develop policies that deal with these issues. Therefore, Lind and Muyingo (2012) argue that there is a need to re-think maintenance strategies, as existing policies do not work and are not adhered to by building owners and businesses. This research lacks any real data for the maintenance requirements for these buildings and in turn fire safety systems. There is also the potential for businesses to look into reliability and cost savings by not completing maintenance; however, research into property maintenance is underdeveloped (Lind & Muyingo, 2012).

3.2.2 Understanding of Building Policy through Regulation

As discussed in Chapter 2, building policy in Australia has continued to evolve and reform. The pace of reform however has increased due to the recommendations of the *Model Building Act 1991* that each state and territory has adopted in a piecemeal approach. This approach through the development of private actors in the regulatory framework has seen the private sector through a deregulated approval process created a co-regulatory approach with government (Van der Heijden, 2008) for the enforcement of building policy. However, this wide-ranging approach, with different methods of enforcement in each state and territory, created confusion at best, and with a complaints-based system at its core that is contrary to the recommendations of the Model Building Act that regulators oversee and audit the private approval system process (Lovegrove, 2021). This national disharmony between enforcement styles created a lack of clarity of roles and responsibilities, ineffective auditing and lack of consistency of interpretation and implementation of the performance provisions under the NCC (Barbaro & Marfella, 2019).

To understand how the privatised building process and regulatory approaches should be implemented, Van der Heijden and de Jong (2009) argue that there are four main areas that should first be identified: quality of rules, enforcement strategy, enforcement style and enforcement actors.

Quality of Rules

Can compliance be achieved through the quality of rules or regulatory goals? Van der Heijden and de Jong (2009) argue that there are four characteristics that addresses this question: the adequacy of

rules, feasibility, legal certainty and adaptability. First is adequacy of rules; these should be compelling, and compliance driven, with significant sanctions for noncompliance. Compliance is driven by the regulators' fear of consequences of noncompliance that the regulation is legitimate and must be complied with. The second is feasibility; this is how the regulators' ability to comply may be limited due to financial or physical concerns or being non-familiar with the regulation. Consideration is given to the perception of being found not in compliance with the regulation and the capacity of the regulator to monitor compliance. The third is certainty; that is, how are the regulations being interpreted, and how are they enforced by the regulator? Consideration in this regard is provided with increasing complexity using performance-based building codes and regulation in the assessment of modern buildings and products. This strategy relies on the private sector as co-regulators, with the emphasis being not how is the regulation complied with, but has it been complied with. The final part is adaptability; this reviews how the regulation can be altered to changing environments given consideration to performance-based building codes being able to adapt to changing environments.

Enforcement Strategy

Enforcement strategy refers to the enforcing agencies' choices about resourcing, setting targets and outcomes and the behaviour of the agencies in enforcing the regulation. Again, Van der Heijden and de Jong (2009) argue that there are four subcategories in enforcement styles: tactical choices, types of action, mixing strategy and concentrating on risks to achieve compliance. *Tactical choices* refer to setting of targets and outcomes being monitored for compliance. To be successful at achieving goals or targets in a complex environment such as performance-based regulation and building codes, the goal may not be full compliance but just to achieve critical aspects such as structural safety. The problem identified in this issue is that it may be impossible to monitor compliance and goals, as it does not review all aspects of a building's performance; that is, fire safety and provides minimal outputs to monitor. *Types of action* incorporates several styles to achieve compliance, ranging from deterrence-based strategy where the main type of strategy is sanctioning for noncompliance to achieving positive outcomes in lieu of punitive actions such as sanctions. Utilising positive strategies provides a choice to be made to comply with the regulation and receive positive outcomes or alternatively noncompliance will achieve negative results. This could be seen as an incentive-based system. *Mixing strategies* refers to the use of conventional enforcement regimes, being the normal command and control system versus the enforcement strategy of responsive regulation (Ayres & Braithwaite, 1992). This enforcement strategy looks at less punitive systems to a closer alignment for persuasion to achieve compliance. The final topic is *concentrating on risks* or risk-based regulation. This looks at setting standards and influencing and changing behaviours and relies on outputs rather than traditional models to identify and mitigate risks.

Enforcement Style

This looks at different styles of enforcement where there is a wide variety of possible enforcement types. Utilising responsive regulation, Van der Heijden and de Jong (2009) assess that enforcement styles fit into a sliding scale, from a consultative and facilitative approach to a heavily restrictive command and control function proven to be non-effective.

Enforcement Actors

The public agencies that enforce regulations are the agents or inspectors who carry out the task of enforcement. Van der Heijden and de Jong (2009) argue that it is best to use people involved in the regulation process to enforce the policy. This could be in the private sector where they use performance-based regulation to also enforce the regulations. The private sector in design and compliance is best suited to review and check for compliance as a co-regulator.

Essentially Van der Heijden and de Jong (2009) further argue that these four main areas of regulation are needed to be fully understood by all including building owners in order to enable a positive compliance result for the private building regulatory system that could work by including a co-regulatory approach that is enforced via a method involving a mix of enforcement strategies and styles, a key component of the *Model Building Act 1991* recommended by AUBRCC. This study reviews the role of building regulation and enforcement regimes in an Australian context; however, this research does discuss or consider ongoing enforcement regimes and policy, including the role and implications of maintaining a building's fire and life safety to be fit for purpose to comply with the policy requirements for buildings in the post-construction stage.

3.2.3 Maintenance Obligations of Owners

The importance placed on maintenance obligations of the owner has increased exponentially over the years with the increased use of performance in the building assessment stage, without the necessary enforcement of or education about the policy by the owner (Shergold & Weir, 2018). Building owners are expected to have the knowledge attributes to understand the policy and maintenance requirements at handover for highly complex building systems to be maintained adequately and be fit for purpose (Crommelin et al., 2021). As fire and life safety measures in a building are required to be regularly maintained at predetermined levels and frequencies over the life of the building (Productivity Commission, 2004, p .234), this means higher running costs for building owners and companies alike (Bukowski & Babrauskas, 1994; Horner et al., 1997). There also does not appear to be an extensive understanding of these ongoing maintenance costs considered in research (Bukowski & Babrauskas, 1994; Horner et al., 1997), as this does not cover ongoing maintenance costs for fire safety systems over the building's life. By way of example, in Victoria, every building regardless of age (apart from

detached dwellings and outbuildings) is required to have its essential fire and life safety measures maintained as part of the lawful occupancy of the building (Victorian Building Authority, 2020); however, there is little evidence that this is actually being achieved. An increase in performance solutions now being used as part of the building approval and construction process has increased the reliance on fire safety system maintenance processes. This reliance is not fully understood by building owners and companies (Better Regulation, 2023; Productivity Commission, 2004) and is not widely or consistently enforced by the regulator (Shergold & Weir, 2018). Therefore, there is no incentive for building owners when they purchase apartments in multi-storey buildings and owners' corporations to ensure there are suitable arrangements in place to verify that fire safety systems are being maintained in line with regulatory standards (Carter, 2019). This includes an understanding and recognition by owners and companies that lease these buildings that they are required to self-regulate and complete all necessary maintenance checks (Productivity Commission, 2004, p. 234), without any proper or regulatory oversight by government agencies throughout the life of the building.

3.2.4 Understanding of Building Maintenance: Existing Literature

Previous studies (Productivity Commission, 2004; Van der Heijden, 2008) have concluded that the role of maintenance is not readily understood by building owners and the general public and enforcement of the policy is poor (Shergold & Weir, 2018). O'Brien (2016) considers building code changes in response to major catastrophic events; however, the impact on maintenance was not considered in this research to any large extent. This also highlights the need to examine ownership obligations and understanding of practice versus policy.

O'Brien (2016) appears to be the first to discuss the codification of existing building practice into policy and looked at three principal mechanisms for change: logical incrementalism, emergency strategy and co-participative change management models (O'Brien, 2016, p. 28). By applying these principles, O'Brien discusses the changing code requirements that could be adopted into policy and describes emergent strategy as a 'code by catastrophe' (2016, p. 72) to meeting community expectations as a reactionary approach to events. In this regard, maintenance for fire and life safety systems could be viewed as emergent strategy, as this policy was adopted in Victoria in 1994 under the Kennett era of reforms to building policy in response to community expectations (Victorian Parliament, 2013). However, this study largely ignored the implications of maintaining a building in the post-construction era to be fit for purpose and in compliance with ongoing maintenance regimes.

O'Brien discusses code development as a balanced approach between goals, operational processes and stakeholder interests (2016, p. 70) and refers to the bootstrapping approach to codify traditional practices as a basis for minimum standards (Wolski et al., 2000). Bootstrapping refers to the process

by which changes occur as a result of existing practices being integrated into code development through goals, operational processes and stakeholder interest (Wolski et al., 2000).

While these change-based models could be used as an example of understanding the critical component for the ultimate effectiveness for the implementation of policy, the requirements for the maintenance of buildings does not represent what is happening in industry. Bootstrapping, however, may be useful to determine the risks associated with the safety of buildings post construction, with the changes being incrementally introduced to accommodate amendments to policy. O'Brien does not discuss the important aspect of post-construction obligations emanating from a purely performance-based building code that is administered through the private sector by building surveyors throughout Australia. This major exclusion does not contribute to knowledge for policy developers and owners regarding this important issue.

Some research has reviewed the need for building management plans to interface with authorities as key items in effective fire safety management (Wong & Xie, 2014, p. 410). Using this research, fire safety systems can also be integrated within this management plan to ensure that authorities are aware of the maintenance requirements for both active and passive systems installed in those buildings. Interestingly, Wong and Xie (2014) do not report on these maintenance provisions in their research. As part of the initial building design stage, fire and life safety systems are a comprehensive set of systems that are tailored to suite the individual building that it is applied. In addition, the maintenance plan determines the frequency of inspections and standards for buildings that are required to be maintained. This management plan can be an organic document that changes over the life of a building, with management and owners required to be kept up to date with this changing system (Wong & Xie, 2014, p. 410).

Recent research into the customer's role in the selection of a service provider to complete maintenance provisions found that developing relationships with the supplier and customer proves beneficial (Sillanpää et al., 2016). The research by Sillanpää et al. (2016) is interesting, as it reviews customer requirements regarding the maintenance provisions for buildings. Most other research that has been completed regarding building policy concentrates on owners' obligations while acknowledging that the owner has little or no understanding in this area (Productivity Commission, 2004). Sillanpää et al. (2016, p. 51) completed a qualitative study of customers' possibilities to support the supplier; in this instance five of the largest facility management companies in Finland were interviewed. The study looked at the relationship between the service provider and customer to determine the ability to save on future maintenance costs over the life cycle of the building. While this study reviews the ownership requirements to maintain buildings, it assumes that the owner has a strong understanding of facility management and therefore statutory maintenance provisions. Interestingly, research in Australia has proven that this is not the case (Van der Heijden and de Jong,

2009; Productivity Commission, 2004) and that ownership obligations for multi-storey high-rise buildings are complex in nature and building owners are not fully aware of these requirements (Carter, 2019; Shergold & Weir, 2018) or the implications to ensure the building remains safe and in compliance with the policy.

A key recommendation from a report commissioned by the Commonwealth Government (Shergold & Weir, 2018) addresses post-construction information management that essentially provides for a comprehensive ongoing maintenance management plan for commercial building owners to be developed to enable the building to be maintained over its life cycle. This report, however, did not review the implications of the policy and ongoing maintenance of the policy by building owners and regulators, thereby leaving a research gap to be filled to understand the translation of the policy into practice.

3.2.5 The Reliance on Maintenance Obligations by Owners

Blayse and Manley (2004) discuss six primary influences in the approval and construction process: (1) clients and manufacturers; (2) the structure of production; (3) relationships between individuals and firms within the industry and between the industry; (4) external parties' procurement systems; (5) regulations and standards; and (6) the nature and quality of organisational resources. This research is important as it highlights the construction technologies to drive innovation and discusses the influence of a performance-based regulatory system over a prescriptive one to achieve a desired outcome; however, it failed to acknowledge the impact that innovation has through a performance-based regulatory system on future ownership obligations. Blayse and Manley (2004) conclude that imposing too strict regulation may impact on industry to develop new technologies. Conversely the increased use of performance-based solutions in the approval and construction process can impact on the overall life cycle cost of buildings (Saghatforoush et al., 2011), which has not been discussed in previous research findings.

Research by Saghatforoush et al. (2011) considers general maintenance requirements on infrastructure projects; however, this research does not specifically refer to fire safety maintenance programs or policy emanating from an increased use of active fire safety systems when applying performance-based building codes in the design of buildings to reduce the cost burden of construction. This paper falls short by not considering maintenance issues in the overall life cycle costs of maintaining a building's fire and life safety systems. Other research (Productivity Commission, 2004, p. 109) has confirmed that the increased use of performance-based design of buildings has provided a shifting of costs from the construction phase to the maintenance phase. However, this research did not detail or acknowledge the extent of the performance-based regulatory system in the design of buildings to an overall cost for maintaining a building over its lifespan, where maintenance costs amount to more

than half of the cost of construction (Saghatforoush et al., 2011). Further research suggests that there is minimal understanding by building owners regarding the cost implications of maintaining buildings, including a building's life and fire safety system (Productivity Commission, 2004; Shergold & Weir, 2018).

To raise awareness for owners and the general community, Van der Heijden and de Jong (2009) consider an incentive-based regime that is integrated into insurance premiums to provide for compliance. Presently insurance companies have not required building owners including companies to provide compliance checks regarding their fire and life safety maintenance requirements (Productivity Commission, 2004, p. 73). This refers to incentives and links insurance premiums to the actual performance; therefore, insurance can only be obtained if compliance with the regulation is achieved. This is essentially occurring now with the privatisation of building assessments, approvals and development of buildings in Australia, insurance premiums have been increasing for building industry practitioners in Australia (Department of Industry Science Energy and Resources, 2019). Some in the building certification professionals are finding it difficult if not impossible to obtain mandatory insurance premiums, which has resulted in a number of building industry practitioners leaving the industry (Ferguson & Norington, 2019).

There are a number of existing policy options regarding maintaining buildings post construction. One is the New Zealand policy of obtaining a 'building warrant of fitness' (BwoF). This policy requires the building owner to submit to the local government a BwoF statement each year that certifies that the building has been maintained and checked for the previous 12 months (New Zealand Government, 2020). This system is administered by the regulator; in this case the applicable local government area where the building is located (Duncan, 2005). This system was considered by the Productivity Commission for Australian conditions (2004, p. 235); however, it was not part of any recommendation in their final report and is considered a failed opportunity to review the ongoing enforcement and education of the policy to consumers and building owners.

Similar systems operate in certain states and territories in Australia. One that shows some similarity to the New Zealand's BwoF is that of South Australia, NSW and Queensland that have mandatory reporting requirements (Scimonello et al., 2019). In many states in Australia, the policy requires commercial building owners to self-certify that they are continuing to maintain their fire and life safety systems, that they are fit for purpose and can operate as intended (Australian Building Codes Board, 2015; Productivity Commission, 2004). Of interest, the outcomes emanating from the Grenfell apartment fire that resulted in the deaths of 71 people (Rawlinson, 2017) recommended a different approach for compliance, in that maintenance of multi-storey residential apartment buildings are too complex and building owners and other professionals may not understand the intricacies required to maintain and operate a systems as intended in an emergency event (Hackitt, 2018). The Hackitt

(2018) report recommended reducing risk for building owners, including engagement of residents at the earliest opportunity as they are ultimately responsible for the maintenance of complex fire safety systems.

Meng (2013) suggests that the need for maintenance of buildings can be substantially prevented if early intervention and integration between design professionals and facility managers are undertaken. This study interviewed over 30 facility managers and could be used as a model to reduce maintenance obligations with respect to ongoing reliance on fire and life safety systems. However, it failed to examine the links of general maintenance and the implications of a deregulated building policy. Meng's study (2013) has the potential to incorporate fire and life safety system maintenance to facilitate a reduction of ongoing running costs and highlight the importance of the policy; however, building owners are essentially unaware of the design methodology imposed early in the construction and feasibility stage that has substantial implications for the ongoing use of buildings (Productivity Commission, 2004; Van der Heijden, 2008). From these studies, it has been demonstrated that owners are unaware of the methodology used in the building design stage that will have major implications for the ongoing use over the life of the building.

Some research has discussed the need to adopt a preventative maintenance mindset to enable a prediction of potential breakdowns (Stone & Cluff, 2015); this also includes the regulatory role that would be required for property owners. Stone and Cluff (2015) also discuss the shift away from maintaining buildings from being an ad hoc arrangement to one that has been established through facility management. Buildings now are far too complex in nature to not be afforded due care and consideration and are required to be maintained in order to be fit for purpose and meet community expectations and business needs (Al-Turki, 2011). Saghatforoush et al. (2011) further suggest that high standards are required for maintenance personnel, particularly for complex developments. Complexity in the design of buildings raises serious technical implications for companies that own extensive property portfolios. This research does look at the importance of building owners to use qualified personnel to assist with compliance with building maintenance policy; however, there are no current ongoing policy requirements to ensure compliance. Some states (NSW and Victoria) have recently introduced a fire practitioner registration scheme categorisation for maintaining and inspecting active fire safety systems for commercial buildings (Fire Protection Association Australia, 2020; New South Wales Government Department of Fair Trading, 2021; Victorian Building Authority, 2021, 2023), however this has not been adopted in any other state or Australian territory.

Having discussed the research into the maintenance of buildings, the next part of the chapter will explore the international requirements for performance-based building codes.

3.2.6 Reflections on International Policy for Fire Safety of Existing Apartment Buildings

Honk Kong implemented a mandatory building inspection scheme (MBIS) for multi-storey residential buildings (over three storeys in height) to determine the severity of poor maintenance regimes that posed a serious threat to community safety (Chan, 2019; Chan et al., 2014). Research by Sing et al. (2015) into the Hong Kong MBIS identified approximately 24,000 buildings that are subject to this policy that require mandated inspections every 10 years. As part of this process, building upgrades are also required to meet community expectations to ensure that they are safe and fit for purpose (Chan, 2019). This policy was instigated as a reaction to over 143 building safety related accidents that caused 101 deaths and over 435 other injuries (Sing et al., 2015). Through a quantitative study of the professional workforce that undertakes building inspections via their professional institutions using an online survey, this research confirms that 30% of all buildings in Hong Kong are in a dilapidated state and therefore pose a substantial risk to their occupants (Chan et al., 2014; Sing et al., 2015). Although this study does not include fire safety systems, the requirement for mandatory inspections by qualified personnel such as engineers, building surveyors or architects would include review of existing fire safety systems and ensure that mandatory maintenance regimes are implemented, thereby reducing the overall risk to the community and building occupants.

Some research (Douglas, 1996) suggests that buildings constructed from the 1970s should be subject to certain statutory obligations, as they are considered a liability. Australia's building approval system requires a different approach to the acceptance of specific documentation at the completion of a building project and some require mandatory reporting of their maintenance requirements (Van der Heijden, 2008). However, this information is difficult to access, as it is not readily accessible for auditing or managing (Shergold & Weir, 2018). Some states and territories require ongoing maintenance records to be submitted for commercial buildings, including multi-storey residential buildings, to local governments that has been discussed previously, however the actual compliance of this policy is not regulated, enforced or known (Productivity Commission, 2004; Shergold & Weir, 2018). There is no direct management of this policy by regulators as opposed to the Hong Kong MBIS policy or the New Zealand building warrant of fitness requirement.

Table 3-2 represents countries utilising performance-based building codes including their respective maintenance regimes.

Table 3-2: Different Countries Utilising Performance-Based Building Codes

Country	Performance-based Building Codes *1	Maintenance Provisions	Mandatory Reporting Requirements	Comments	Source
New Zealand	✓	✓	✓	A performance-based building code including ongoing maintenance provisions and reporting, administered by local government after failure of the private sector involvement through the leaky building syndrome.	Meacham (2009)
Netherlands	✓	✓	✓	Through the Housing Act and Building Decree that came into force in 2003. Fire safety and maintenance measures including mandatory scheduled maintenance inspection certificates and mandatory reporting are required through the Building Decree of 2012 as detailed and specified in Table 1 for certain commercial-style buildings.	(Meacham, 2009); Netherlands Enterprise Agency RVO (2020)
Australia	✓	✓	*2	Fully performance-based building code administered through local and state governments in each jurisdiction.	Australian Building Codes Board (2019c)
North America	✓	✓	✗	Uses a performance-based model codes used throughout the US now using through the International Code Council through international codes. Property maintenance and fire codes establish fire maintenance requirements for buildings.	Meacham (2009) Meacham (2009) Foliente et al. (2005)
England	✓	✓	✓	Administered by building control officers. Initially introduced albeit minimally in 1983, the system is fully performance orientated, through the Building Regulations 2010. Following the Grenfell fire, through the Hackett report, building life and fire safety maintenance is required to be regular undertaken through the Fire Safety (England) Regulations 2022.	Meacham (2009) Government of the United Kingdom (2022a) (Government of the United Kingdom, 2022b)

Country	Performance-based Building Codes *1	Maintenance Provisions	Mandatory Reporting Requirements	Comments	Source
Austria	✓	✓	✗	At time of research from author, Austria had implemented a performance-based building approach through the Austrian Institute of Construction Engineering, known as the OIB guidelines.	Meacham (2009), Mikulits (2008), Austrian Institute of Construction Engineering (2019)
Canada	✓	✓	✓	At time of research from author, Canada had implemented a performance-based building regulatory approach through the National Code Documents. Fire safety and maintenance are covered under the National Fire Code of Canada 2020. Although each province in Canada administers their own building provisions, they are based on the National Fire Code, including fire and life safety maintenance provisions.	Meacham (2009) Foliente et al. (2005) Government of Canada (2020a) Government of Canada (2020b)
Japan	✓	✓	✓	Performance-based building codes introduced in 2000, with maintenance of building equipment requiring periodic maintenance and mandatory reporting that is prescribed in the Fire Service Law and Building Standard Law.	Meacham (2009) Fire Services Act, Japan Watanabe et al. (1985)
Singapore	✓	✓	✓	Performance-based approach to building code introduced in 2004 and administered under the Building and Construction Authority. Has a periodic maintenance and inspection system for fire and life safety matters for existing buildings with legislative requirements under the Fire Safety Regulations that are administered through the Singapore Civil Defence Force.	Meacham (2009) Singapore Civil Defence Force (2002)

Note 1: Indicating that the country has a provision for maintaining a building's fire and life safety systems post construction.
Note 2: Mandatory reporting only applicable in some states and territories in Australia. Refer to Appendix A and Table 2-6 for further information.

As demonstrated in Table 3-2, most countries that have a performance-based approach for the design and construction of buildings also require detailed maintenance provisions, with many having mandatory reporting requirements.

It is interesting to note that New Zealand was one of the first to implement a performance-based building code in 1992 (Duncan, 2005); however, due to the 'leaky building syndrome' experience, greater quantification was introduced to satisfy some components of the building code. The leaky building syndrome refers to weathertightness to buildings constructed in New Zealand that emanated from a deregulated building policy in that country (Murphy, 2011).

Recent research in Jakarta concluded that 42% of the total multi-storey buildings are unreliable and failed in most cases when tested. Recommendations from this research included more awareness is required in the community to highlight this risk to life, with increased auditing by regulators and a new traffic light warning system to be implemented (Rahardjo & Prihanton, 2020).

In Australia, the ABCB have embarked on a quantification project that has seen about 40% of performance requirements quantified in the NCC 2019 with all remaining performance requirements to be in the NCC in 2022 (Australian Building Codes Board, 2019c). Australia has taken lessons learnt from New Zealand and adopted a full quantification project to be implemented into the NCC Building Code of Australia in 2022 (Australian Building Codes Board, 2019c); however, the complexities and maintenance requirements for the quantification process has not been explored, and therefore this quantification process to comply with the performance requirements of the BCA will not change the outcome for maintenance of a building's fire safety system.

3.2.7 Community Expectations

Van der Heijden (2008) has researched the Australian building regulation regimes and reviewed building policy throughout Australian states and territories. However, this research was very limited and only reviewed existing enforcement regimes in Australia, not how effective they were nor if they provided a best model approach. The research considered several responses from key industry groups, including government departments, large construction firms and private industry stakeholders, through a questionnaire approach; however, community expectations, including building ownership obligations, were not considered in detail in this research. This research concluded that in the Australian deregulated construction industry, by using a performance-based approach for building assessment, building policy has been rated as good to very good and has been more effective and provided cost savings in the construction process (Van der Heijden & de Jong, 2009).

With the use of performance-based building products increasing (The Centre for International Economics, 2013), greater emphasis and awareness for consumers and reliance on independent testing

is required (O'Brien, 2016). This situation is also true for the maintenance of safety systems that are required to ensure occupant safety is maintained over the life of the building (Australian Building Codes Board, 2015). This is also true for tenants of commercial-style buildings and multi-storey residential units, as they do not have any perceived expectations for the performance of buildings but essentially only require that they are fit for purpose (Arditi & Nawakorawit, 1999; Productivity Commission, 2004; Shergold & Weir, 2018). Research completed by (Arditi & Nawakorawit, 1999) provides a valuable insight into the relationship between property managers, tenants and building ownership obligations that is still applicable today and is referenced in a number of peer-reviewed articles. Community expectations and ownership obligations were also reviewed by Van der Heijden (2008) and the Productivity Commission (2004), with their research indicating that community expectations and ownership obligations are not fully understood in terms of building policy and the administration of that policy; that is, enforcement by the regulator. This could also be true with respect to the management processes of fire safety maintenance processes for multi-storey residential apartments.

According to Arditi and Nawakorawit (1999), corporate building tenants who enter into long-term lease agreements do not typically have any expectations for the performance of buildings, other than that they perform as intended. Arditi and Nawakorawit (1999) through their research established an insight into the interdependencies between building ownership obligations, tenants and property managers; this research however did not fully integrated maintenance provisions into these interdependencies. These interdependencies could be applied in a deregulated building policy that will be the subject of this study to determine owners' level of understanding imposed by this regulatory environment.

The Productivity Commission (2004) in their review of the building approval system in Australia also concluded that community expectations and ownership obligations with respect to fire safety systems emanating from a deregulated performance policy is not fully understood, placing further emphasis onto the need for study into this field. Their review however failed to integrate fire and life safety requirements into the post-approval stage despite being provided with evidence identifying the problem of compliance of the policy.

It is noted that the Productivity Commission report *Reform of Building Regulations* (Productivity Commission, 2004) recommendation 5.4 required that where building solutions impose maintenance requirements over the life of the building, this should be documented and available to owners and occupiers (Productivity Commission, 2004). This recommendation has not appeared to be fully implemented in Australia.

A Risk Management Approach

Wong and Xie (2014)argue that a holistic fire safety management plan is required, including a maintenance plan that should be considered in complex developments. Van der Heijden and de Jong (2009) look at risk-based regulation to address building regulation requirements by looking at change behaviour in building owners. With businesses now being risk averse, using a risk management tool will assist to reduce the impact on maintenance requirements, increase knowledge and decrease their liability.

Planning

Al-Turki (2011) suggests that companies should align their objectives to maintenance planning of their buildings to recognise the important role that it plays. Corporate objectives for maintenance should set both qualitative and quantitative requirements, such as the performance of safety systems in a building, with reliability and compliance being a high objective for the company.

Research into the early intervention in building design by building maintenance professionals, namely facility managers, has found it to be beneficial (Meng, 2013). Interestingly, an empirical study completed by Meng (2013), who interviewed over 30 professional facility managers in Britain, concluded that early intervention and integration between facility managers and design professionals such architects and engineers had proven to prevent maintenance problems occurring in the post-construction phase. This study also provided evidence for the benefits of a longer-term view of maintenance provisions to enable buildings to be fit for purpose.

Al-Turki (2011) suggests that there are four basic principles to maintenance: run to failure, preventative maintenance, condition-based maintenance and design improvement. When applying these four principles, fire and life safety maintenance could be seen as a preventative maintenance, although research would appear to conclude that fire and life safety maintenance is really a run to failure method (Productivity Commission, 2004, p. 112). Although, this report did conclude that a building's safety system should be maintained to fulfil its purpose through the lifespan of the building, it acknowledged that maintenance strategies could include a run until it breaks down strategy. Only then would the system be replaced in order for the building system to operate again as required.

Stone and Cluff (2015) look at changing the mindset towards maintenance to one that is preventative in nature. They further recommend three main processes to be deployed: what historical practices have been previously deployed; what test method should be adopted; and finally, to assess and manage data. This method could be adopted for established buildings that are required to be upgraded with specific management practices to be deployed. This is similar to existing systems and current policy requirements: first, establish existing practices, that is, what has been completed, then establish

new practices in line with current policy requirements and finally, develop methodologies to align with policy and maintain data for future use. Changing the mindset of building owners and companies to adopt a preventative building maintenance regime is worthy of further research.

The next part of this chapter will discuss different regulatory regimes that have been utilised for compliance of building policy and their accountability in terms of a largely performance-based approach by use of private building surveyors in the approval processes for buildings in Australia, and how this compares to using the TPB as a compliance mechanism.

3.2.8 The Role of Regulatory Regimes in Building Policy: An Australian Context

May (2007) describes the way that the regulatory reform paradigm has shifted over recent times to achieve regulatory goals. These changes however encompass four different ways to administer a regulatory regime: voluntary approaches where regulators work with industry associations using codes of practice, self-auditing practices using third parties, management-based systems that prevent deviation from structured plans and finally, performance-based regulation that encompasses results rather than prescriptive regulation. Although in some part, prescriptive regulation has widely changed traditional forms of compliance with regulation, being enforcement of governance rules by government actors.

Although May's review (2007) of regulatory regimes does encapsulate performance and system-based regulation for building and fire safety, this research however also requires a governance role in enforcement, and it does not cover how or what is the best method to enforce these mechanisms. Using system-based or performance-based regulation in building regulation policy looks at a higher use of active and passive life and fire safety systems; this is not considered in this research paper. This is remarkable, as the use of performance-based regulation will only adapt to community safety concerns if these systems are applied and maintained over the life of the given building.

Performance-based regulation sets the outcome goals for individuals or others in the regulatory field to meet (Coglianese et al., 2003); however, performance-based regulation still requires state-based regulators or actors to monitor the outcomes of the decisions and processes (Coglianese et al., 2003; May, 2007). Spinardi (2019) discuss that for BPD to operate effectively, needs careful attention to auditing of private building surveyors to establish that the designs meet the performance provisions, however the regulators themselves lack the suitable expertise for this to occur. Although when it comes to enforcement of performance-based regulations for the construction of buildings, some may argue that privatised regimes are well placed to administer building code and policy requirements and fix noncompliance with regulations (Lang et al., 2022; Spinardi, 2019; Van der Heijden, 2010). Similarly, private sector involvement can be far superior to public sector involvement, as the level of expertise in the private or corporate sector is superior to the public sector for technically complex

systems (Ayres & Braithwaite, 1992). Some research has concluded that many public approval authorities that review complex buildings and use performance-based regulation in the design and construction of buildings, lack the expertise and knowledge to interrogate and assess complex designs in a neoliberal era on building regulation (Spinardi, 2019). However, May (2007) argues that for performance-based regulation to work effectively, the emphasis should be on monitoring the adequacy of the decisions and methods undertaken, as the lack of expertise in government regulators will be undermined when conducting critical stage inspections on buildings due to this lack of expertise.

With the privatisation and regulatory reform currently occurring throughout Australia (Van der Heijden & de Jong, 2009), the move to a more responsive regulatory environment with more reliance on the skills of the private sector to monitor and co-regulate themselves is gaining traction. In 2019 in an industry meeting with the major building industry groups, the Building Ministers Forum requested that industry groups prepare for and take charge of their own shortcomings in enforcement and professionalism regarding building regulatory policy in Australia (Department of Industry Science Energy and Resources, 2019). This type of enforcement policy could be referred to the public interest or helping hand theory. Using the 'public interest' or helping hand theory (Shleifer, 2005) provides two assumptions, the first being unhindered markets often fail due to monopoly or externalities and the second that governments are benign and capable of correcting these market failures through regulation. This means that governments provide the safety standards of buildings to protect community safety and regulate other aspects in which the private sector must operate. This heavy regulatory aspect places social reforms for the community in the 20th century (Shleifer, 2005) but has also allowed public ownership and regulation. Therefore, co-regulation with industry has been proven to succeed, especially where the private sector has the necessary expertise to carry out approvals and enforcement of complex buildings using the NCC.

Throughout Australia the privatisation of building code enforcement has essentially seen the private sector approve and enforce the building code on increasingly complex and modern buildings. This allows the private sector to act as co-regulators with government actors.

Most Australian states rely on private certification for the enforcement and implementation of building regulations; however, each state and territory are tasked with compliance of building regulations post occupancy. This is mainly achieved by mandatory reporting requirements for maintenance of buildings in South Australia and NSW, however all other states and authorities, it is a user-based compliance performance approach. As suggested by May (2007), state-based regulators do not have the expertise or resources to assess and enforce compliance of building regulations (Victorian Auditor-General, 2011) and instead rely on a co-regulatory approach by industry associations (Department of Industry Science Energy and Resources, 2019); this however needs to be

consistent with the recommendations through the ABCB response to the *Building Confidence Report* recommendations (Australian Building Codes Board, 2021a).

The literature and research findings demonstrate that the understanding and importance of maintaining fire and life safety systems are not recognised by building owners and owners' corporations. Some research (Douglas, 1996) suggests when performance-based building codes are in their infancy, building performance is an important factor that reflects various uses and statutory demands. Therefore, it should be recognised by building owners and regulators that buildings being fit for purpose also includes ensuring the fire and life safety system maintenance requirements are also being met.

So how do we get building owners to comply with the policy? The next part of this chapter will draw on the theory of planned behaviour and explain how this theoretical framework can be used to manage building maintenance policy and enhance community safety for building occupants.

3.3 The Theory of Planned Behaviour as a Compliance Mechanism for Building Policy

The theory of planned behaviour (TPB) was refined by Icek Ajzen in 1991 from earlier work by Ajzen and Fishbein (1980), being the theory of reasoned action. The theory of reasoned action, however, did not deal with behaviours over which people have incomplete volitional control (Ajzen, 1991) and only concerns behaviours within a person's control. The TPB, on the other hand, focuses on an individual's intention to perform a given behaviour.

The TPB can be viewed as three main categories, each dependant on the other. These are beliefs that the behaviour or the likely behaviour will provide an outcome; behavioural beliefs produce an attitude toward the behaviour either favourable or unfavourable; beliefs about factors may influence or impede a performance of the behaviour – this is normative beliefs and the perceived social pressure to engage or not engage in a behaviour. The strength of each normative belief is weighted against the person's motivation and the subjective norm. Subjective norms are the perception or support of relevant others. Finally, beliefs about the presence of other factors may facilitate or impede performance of the behaviour. The perceived control behaviour is people's perception of their ability to perform a given behaviour. Generally, the more favourable the attitude and subjective norm, and the greater perceived behavioural control (PBC), the greater the intention to achieve the behaviour (Ajzen, 1991), see figure 3-1.

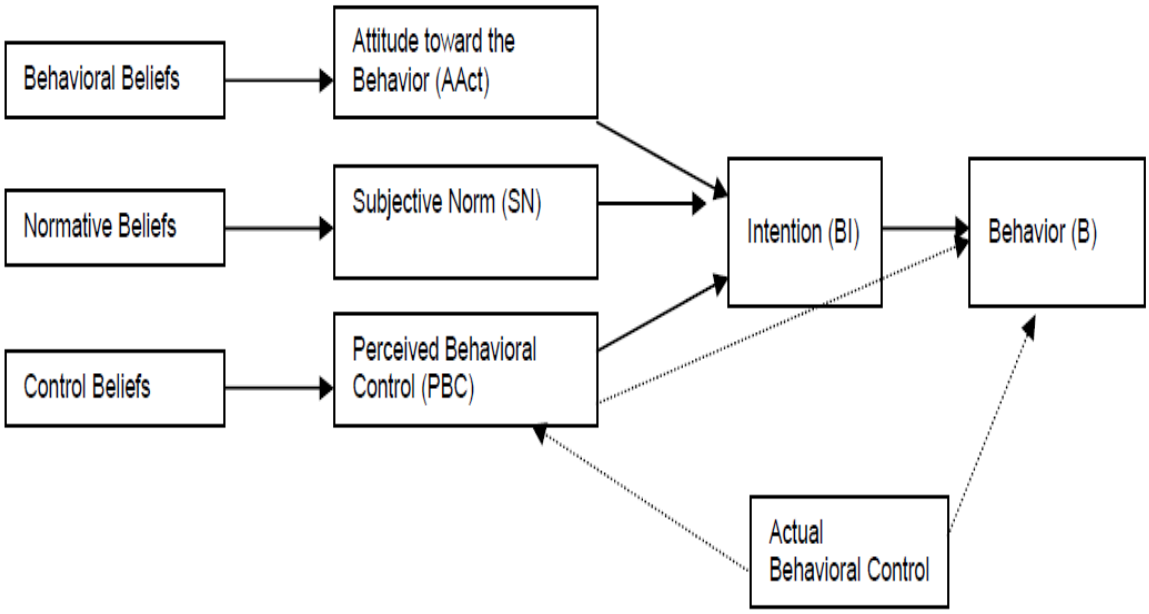


Figure 3-1: The Theory of Planned Behaviour

Source: Ajzen (2019)

3.3.1 Behavioural Beliefs and Attitude

The first construct using Ajzen's theory is 'behavioural beliefs'. Behavioural beliefs link the behaviour of interest to expected outcomes and experiences (Ajzen, 2019) and attitude toward the behaviour is favourably or not favourably valued (Ajzen, 2019). Therefore, attitudes are derived from the beliefs that people hold about an object, person, event or characteristic of the attitude. Each salient belief is linked to the behaviour of a certain outcome (Ajzen, 1991). The attitude can be calculated involving the strength of each belief being weighted by (*x*), the evaluation of the outcome or experience, and then aggregated (Ajzen, 1991).

$$A \propto \sum_{i=0}^{n} b_i e_i$$

In this equation, *A* is attitude toward the behaviour, *b* is the strength of each belief and *e* is the evaluation of the outcome or experience and is aggregated.

Ab Ghani (2013) suggests that attitude for a given behaviour reflects an evaluation of the consequences from doing the behaviour. Therefore, this can be calculated as the sum of the (expectation) × (value) items yields the attitude towards the behaviour .

Research by Nzewi (2017) into compliance in the public sector local government spheres found that by using the TPB as a compliance mechanism, the TPB can be used as an audit compliance mechanism with procedures.

Further, Nzewi (2017) suggests that the TPB model using attitude motivators could be used for work procedures, being:

> 1 *Consequences perceived to be of significance to employees in relation to a particular behaviour.*
> 2 *Anticipated beliefs and feelings (affective responses) of employees in relation to a particular behaviour.*
> 3 *As an additional variable to test attitude, functional bases for processing information aimed at compliance.*
>
> (Nzewi, 2017, p. 6)

Compliance of building control, including maintenance provisions, is generally through local government authorities (Van der Heijden, 2008; Van der Heijden, 2009), and therefore would be applicable for this research Nzewi (2017). Nzewi (2017) also proposed that implementing set policies and procedures in line with the TPB can identify behaviour modifiers or motivators to address audit compliance procedures for local government audit practices. This study is similar in that it used the TPB to motivate behaviour of building owners and owners' corporations for multi-storey residential buildings to address and manage their ongoing procedures and processes. This can also include practices of local government auditing and compliance mechanisms to promote compliance.

Similarly, Ab Ghani (2013) proposed using the TPB concepts to predict whistle-blowing intention among supervisors in Malaysia, and research completed by Smart (2013) looked at the TPB for tax compliance. This is similar to compliance mechanisms for the ongoing life safety of fire and life safety systems for multi-storey residential buildings.

The TPB (Ajzen, 1991) and theory of reasoned action (Ajzen & Fishbein, 1980) argue that in terms of attitude, any behaviour can be predicted, albeit as a single behaviour or a number of behaviours. This however is dependent on the attitude being measured and corresponding to the behaviour. The TPB requires the behaviour to be as specific as possible; that is, be the target. Therefore, the target behaviour in this research is the behaviour of owners regarding the ongoing maintenance of their building. Further, the specific behaviour to determine the factors that influence the compliance behaviours – that is, beliefs and attitudes – would need to address the time and context.

3.3.2 Normative Beliefs: Subjective Norms

The second construct using Ajzen's theory is normative beliefs and 'subjective norms'. Subjective norms are the compilation of a person's normative beliefs; that is, the person's belief in what other significant people believe they should do. This could be a referent group, being their friends, peers, spouse and family. The subjective norm is the perceived social pressure to engage in a behaviour or not to engage in a behaviour (Ajzen, 1991).These elements could be multiplied by an individual's motivation to comply , the calculation being the (expectancy) × (value) will provide the subjective norm (Ab Ghani, 2013). In this study, normative beliefs could also extend to building occupants in addition to their referent family group, peers and friends.

Subjective norm is the perceived social pressure to engage or not to engage in a behaviour (Ajzen, 2019) and is represented by the following equation.

$$SN \propto \sum_{i=0}^{n} n_i m_i$$

where *SN* is the subjective norm, and the strength of each normative belief *n* is weighted by the person's motivation to comply *m* and is aggregated.

Individuals who are motivated by the social pressure to engage in the behaviour will provide a positive subjective norm, while individuals who do not engage in a particular behaviour due to the referent family group, peers and friends think that they should not engage in a partially behaviour provide a negative subjective norm (Smart, 2013).

Of note when reviewing the TPB to use as a compliance mechanism, Smart (2013) discusses using the TPB to develop a mechanism for compliance. This research used the TPB as the key framework to develop tax compliance. This study looked at taxpayers who believe that important referents are compliant with that behaviour will themselves be compliant; conversely, if those important referents are in noncompliance with the behaviour, they themselves will not be compliant (2013, p. 8). Smart's research (2013) can directly influence this study, as a way to influence a behaviour for an important referent in building ownership obligation. Similarly, Nzewi (2017, p. 7) through research completed for municipal audit compliance suggests that important referents are identified and therefore should be taken into consideration, along with other social agents or actors who are embedded into the local government compliance environment. In this research, referents would be other property owners, friends and peers. Through the use of the TPB (Ajzen, 2005), the support of ones friends, co-workers and supervisors influences the given behaviour of an individual by encouraging or discouraging the behaviour to achieve compliance (Nzewi, 2017). This is further reinforced by several other studies that confirm this model for subjective norms (Ajzen, 2002; Ajzen & Fishbein, 1980; Bobek et al.,

2013). Bobek et al. (2013) suggest that family, friends, co-workers and significant others can influence behaviour albeit positive or negative to achieve regulatory compliance. Therefore, the link between building ownership and compliance through normative beliefs can be considered.

3.3.3 Control Beliefs: Perceived Behavioural Control

The last of the constructs using Ajzen's theory is 'control beliefs'; that is, perceived behavioural control (PBC). PBC consists of two parts: control beliefs and behaviour control (Ab Ghani, 2013). Control beliefs consider the perceived factors that may impede or facilitate a behaviour (Ajzen, 2020). These are beliefs about a set of factors that they believe may facilitate or impede a behaviour. It is believed that the perceived factor will influence the likelihood of performing the task in direct proportion to the perceived difficulty of the belief. So, if the person believes the task will be difficult to perform, the less likely the person is to do the task. Control beliefs refers to factors that may influence or not influence a given behaviour (Ajzen, 2002).

$$PBC \propto \sum_{i=0}^{n} c_i p_i$$

Ab Ghani (2013) suggests that PBC can be calculated by the total set of accessible control beliefs. Their perceived ability to perform the task will influence the likelihood of completing the task or the amount of effort put into the task in direct proportion to the perceived difficulty that is under their control. PBC can be calculated by the sum of (control beliefs) × (perceived power of control) (Nzewi, 2017).

3.3.4 Discussion

The TPB sought to add scientifically to a major limitation coming from the theory of reasoned action (Ajzen & Fishbein, 1980). The theory of reasoned action concentrates on attitudes and subjective norms for behaviour intention. This theory essentially did not allow for predicting specific behaviour where the subject has no volitional control (Nzewi, 2017, p. 8; Ajzen, 2091, p. 181). The TPB is essentially the intention to comply or to behave a certain way. It considers that intent could be limited by factors that would be beyond an individual's volitional control, and therefore this is factored in by considering motivation that would be the perceived ability to behave in a certain way (Nzewi, 2017). When you review the TPB against this study, both the intentions of stakeholders, being the local government regulatory component, and owners of multi-storey residential buildings would be suitable to determine individual volitional control.

Local government regulators have been seen as having insufficient practices for the management of ongoing statutory maintenance strategies for buildings (Better Regulation, 2023; Productivity

Commission, 2004; Shergold & Weir, 2018, p. 54; The Centre for International Economics, 2013, 2021) as well as a distinct lack of knowledge and understanding of the responsibilities that owners have to maintain their buildings (Productivity Commission, 2004; Shergold & Weir, 2018). This could affect volitional control and provide the conditions for noncompliance. Therefore the TPB will be able to predict this compliance behaviour (Nzewi, 2017).

The Theory of Planned Behaviour (TPB) is one of the most widely applied frameworks in the social and behavioural sciences, extensively examined through empirical research. It has been featured in approximately 4,200 papers, addressing areas such as health sciences, environmental science, business and management, and educational research (Bosnjak et al., 2020). Other studies using compliance mechanisms to influence behaviours of individuals will now be discussed, as compliance of fire and safety systems for multi-storey residential apartment buildings using Ajzens TPB is the basis of this research.

The TPB in Fire Safety Maintenance Compliance Literature

There have been minimal studies using the TPB to change behaviour of individuals to achieve compliance in the built environment. Some however have used the TPB for compliance in tax Law, by way of example, Smart (2012) used the TPB in New Zealand. This research incorporated additional constructs by integrating theories such as Deterrence Theory, Procedural Justice Theory, and Motivational Posturing Theory and examined how these theories could influence or enhance the constructs of the Theory of Planned Behaviour (TPB) to improve compliance. The additional constructs however did not achieve satisfactory results to enhance or motivate individuals behaviour, however, the constructs of the TPB was proven positively. Vinnell (2020) used the TPB to determine the intention of individuals to prepare for natural hazards in the built environment, whilst other researhers (Zaremohzzabieh et al,. 2021) have used the TPB to review household preparedness for future earthquake disaster risk. Of interest to this research, was that their findings supported an extension to the model of the TPB, however Perceived Behaviour Control had minimal significant effect on the intent of the individual to prepare. This is in contrast to Ajzen's theory that a positive attitude and a supportive subjective norm motivates someone to engage in the behavior, but a concrete intention to act is formed only when there is a strong sense of perceived control over the behaviour (Ajzen, 2020). From the literature, there appears to be minimal research on compliance for maintainting a building fire and life safety provisions in Multi-storey residential apartment buildings, however the TPB is supported to be used to determine compliance with regulations and codes of practice as detailed above.

Demographic Factors

Although demographic variables have been added to this study, such as age, gender education level, employment status for council employees and position in the organisation, the TPB concludes that

these characteristics do not affect the outcome of the individual or behaviour; these variables have been left in to determine if these factors have any effect on the ability to undertake or understand the legislative environment, including the ability to maintain or manage a building's complex fire maintenance provisions. As previously identified, fire safety systems are becoming more complex (May, 2007; Shergold & Weir, 2018), and these safety systems are considered outside of the expertise of some regulators and building owners (Hackitt, 2018; May, 2007; Productivity Commission, 2004; Van der Heijden, 2010). These characteristics will be tested within the framework to determine if the TPB can determine that although a building owner and regulator are dealing with complex systems, this will or will not impact on their intention or ability to carry out the behaviour and determine if further information and education regarding the building's fire safety system for building owners will impact their ability or not to undertake the behaviour – in this instance the carrying out and management of the building's fire safety systems.

Following on from a detailed literature review, it could not be established if demographic characteristics, including education, will empower building owners and regulators to undertake the behaviour. This will be the first time that a study will explore through the TPB that these characteristics will impact and affect the outcome of the individual and behaviour.

3.4 Literature Gap

There appears to be a noticeable knowledge gap regarding the nationalised performance-based building code, being the policy, and the translation into practice for the ongoing essential safety measure (ESM) or fire and life safety maintenance obligations for building ownership. This is not unsurprising, as performance-based building codes were only introduced in Australia in 1996 and have largely been ignored by researchers and academics alike (Van der Heijden & de Jong, 2009). This study will be the first to identify statutory maintenance obligations for owners' corporations and building owners' reliance on fire and life safety systems to be functional and fit for purpose over the life of a given multi-storey residential building. Therefore, this research will continue to expand on existing literature and will specifically explore building policy and the translation into practice to help to fill this knowledge gap.

Based on the literature review regarding the implications for ownership obligations, the following research gaps have appeared:

- An absence of research regarding the nationalised performance-based building code, being the policy, and its translation into practice for fire and life safety maintenance obligations.
- Minimal studies have reviewed compliance of ownership obligations with regard to fire and life safety maintenance obligations.

- Minimal research generally on the translation of the policy into practice for fire and life safety maintenance obligations.

The next stage of this thesis will discuss the need to identify stakeholders and how these stakeholders will impact the research based on the theoretical framework.

3.4.1 Stakeholders

As recommended by Veal (2005) and Sekaran and Bougie (2016) the study will identify and review stakeholder perceptions. The stakeholders identified were considered as they had a vested interest in this study (Watt, 2014); therefore the main stakeholders for this study will be the regulator, being the local authority, and building owners, including their representatives, being predominantly strata managers.

The regulator for this study is the local council authority in each state of NSW and Victoria, namely the building and/or fire safety departments. The local government authorities have the statutory authority to manage and implement the policy to maintain a building's fire and life safety systems over the life of that building on behalf of the community; therefore, they are able to determine the extent of the problem through their respective legislation. In addition to the local government authorities in NSW and Victoria, building owners, including their representatives, that manage those buildings will be equally important, as will industry and owner associations. Industry associations and representatives will be contacted first, as they will have the opportunity to distribute the survey to their members. Table 3-3 details the applicable stakeholders that will be pivotal to his study.

Table 3-3: Stakeholders Applicable to this Study

Name of Stakeholder	Comments
Victorian council authorities	In Victoria, local councils have the statutory authority to administer the building regulations in their respective local government areas, including post-construction maintenance of fire and life safety provisions for multi-storey apartment buildings. Refer to Chapter 2.6 for details on regulation requirements.
NSW council authorities	In NSW, it is compulsory that building owners are required to submit a fire safety statement annually to the relevant local government authority. It is only buildings that are classified as BCA Class 2 to 9, including multi-storey residential apartment buildings, that have been the subject of a building approval or fire safety notice by the local council after 1 July 1988.
Victorian and NSW strata management companies	Strata management companies manage apartment buildings, including their respective statutory maintenance processes, for multi-storey apartment buildings on behalf of building owners and body corporations.
Owners Corporation Network	This organisation represents strata owners in NSW.
Strata associations in Victoria and NSW	This organisation represents building owners in NSW and Victoria.
Individual apartment owners	Individual owners will be contacted to participate in this survey, as the overall responsibility to maintain their buildings life and fire safety systems is theirs.
Online real-estate forums	Online forums will be contacted to ensure adequate reach to building owners regarding their statutory maintenance obligations to maintain a building's fire and life safety system.
Property Owners Association of NSW	The Property Owners Association of NSW accounts collectively for 96% of all property owners in NSW and therefore is a key stakeholder in this research.

3.5 Conclusion

This review has confirmed that the technical literature for maintenance management of commercial buildings, including multi-storey residential buildings, is lacking, with little or no understanding by building owners and the community in this important area. This review has clarified that there is minimal empirical evidence that statutory maintenance and ownership obligations are being met.

There have been some studies in Australia (Better Regulation, 2023; Productivity Commission, 2004; Shergold & Weir, 2018; The Centre for International Economics, 2021; Van der Heijden, 2008; Van der Heijden & de Jong, 2009) that confirms the important role and community expectations that multi-storey residential buildings should be fit for purpose. This includes ongoing maintenance

provisions to ensure the life safety of the community and the building occupants. Again, this is not widely understood by building owners and owners' corporations that own multi-storey residential buildings in Australia.

It has been confirmed that building regulation and policy is not well known or well researched (Van der Heijden and de Jong, 2009; Van der Heijden, 2008), and this is also true for the translation of policy into practice and that owners are either not prepared to fully implement appropriate fire and life safety maintenance solutions or are not aware of this important policy requirement.

The purpose of this research is to examine the extent to which building owners, including owners' corporations, are compliant with respect to their fire and life safety obligations and to determine if performance obligations and self-certification (Productivity Commission, 2004, p. 235) is the best option as policy.

There is a lack of evidence or substantive research in Australia regarding compliance of the policy for maintaining a building's fire and life safety system. According to Carter (2019), the Neo 200 fire that occurred on the corner of Spencer and Little Bourke Street in Melbourne on 4 February 2019 confirmed the majority of the building's fire and life safety systems were either not working or not maintained and over 40% of fire alarms and smoke detection systems in the apartments were not operable. This led to increased evacuation times for the building occupants due to the Victorian Metropolitan Fire Brigade officers advising and escorting residents out of the building. As a result of this fire, the Metropolitan Fire Brigade concluded that the complex design and fire safety assessments using the performance provisions contained in the BCA relied heavily on ESM for occupant safety and provided for occupant evacuation. However, these systems failed as they were not adequately maintained. Further it was concluded that the maintenance schedules were too complex and unrealistic and may not have been achievable to maintain, with the buildings owners' corporation management not fully understanding the complex nature of their specific requirements (Carter, 2019) and thereby not complying with the policy.

The next chapter will explore the methodology to ascertain the intentions and beliefs of building owners as a compliance mechanism for the policy.

Chapter 4: Theoretical Framework

4.1 Introduction

This chapter explores the theoretical framework and the development of the hypothesis aiming to test Ajzen's theory of planned behaviour (TPB). The objective is to assess the attitudes, subjective norms and perceived behavioural control (PBC) of building owners and their representatives to determine their intentions and ultimately their behaviours to undertake the fire and life safety maintenance requirements for their buildings.

Chapter 2 provided a historical framework of building legislation in Australia pertaining to statutory maintenance and the rise of performance-based legislation and identified the requirement to maintain a building's fire and life safety system over the lifespan of multi-storey residential buildings. This was predominantly bought about due to performance-based legislation and the deregulation of building policy throughout Australia. Having identified the literature in Chapter 3 and drawing on Ajzen's theoretical framework, the theoretical model will now be explored, including its structural relationships.

This research will investigate stakeholder perceptions of the policy, their options for changes to promote compliance and build on the existing framework of Ajzen (1991) to capture the intentions and beliefs of building owners to determine their future behaviour through the theoretical framework (section 4.2). This section will also investigate enforcement mechanisms aimed at enhancing compliance; additionally, it will uncover a range of factors that can impact the behaviour of building owners, ensuring continuous and secure occupation while adhering to policy requirements for multi-storey residential apartment buildings.

The next part of the chapter will explore the research questions in more detail, including the development of the hypothesis (section 4.3) and questions that will form part of the framework and link to Ajzen's theory, culminating in additional constructs being developed to enhance compliance techniques for fire safety maintenance provisions. Finally, section 4.4 offers a conclusion and summary of the chapter's findings, and their implications.

4.2 Theoretical Framework

Ajzen (1991) developed a theoretical framework that can determine people's intentions for future behaviour that can be utilised in several different situations. This framework could be considered appropriate to predict behaviour of building owners and owners' corporations or their intentions to

maintain an adequate regime to ensure that their building is maintained to a level that is compliant and safe for occupants.

Based on the literature review, Ajzen's theoretical framework can be further enhanced to address the links between building owners and owners' corporations to establish their level of understanding of mandatory maintenance regimes through a predominantly deregulated building policy.

Since its inception, TPB has been cited over 127,181 times (Google Scholar, 2023) and has been subjected to scrutiny in over 4200 papers; therefore it is one of the most applied theories in behaviour science (Bosnjak et al., 2020). TPB should be able to predict the behaviour of people and would be suited to explore the impulsivity and the ability to respond when required for self-regulation (Ajzen, 2005, 2011). Therefore, this framework is suited for this study in order to predict the intentions of stakeholders to maintain their building to be fit for purpose, compliant with the policy and maintained over the life of the building.

According to Ajzen (1991, p. 188), "*the more favourable the attitude and subjective norm with respect to a behaviour, and the greater the perceived behavioural control, the stronger should be an individual's intention to perform the behaviour under consideration*".

System inputs that are used in the context of this study include the characteristics of stakeholders and their demographic profiles, attitudes, subjective norms and respective capabilities. The stakeholders include building owners and strata managers who manage apartment buildings on behalf of owners and regulators and who are charged with enforcement of the policy. This study is essentially concentrating on those stakeholders who have responsibility and can take (or not take) action to comply with the policy.

Having provided a further summary of the TPB, the following information further explains the interdependency of the framework, in the context of stakeholders and their relationships to this study.

Attitudes are a function of beliefs about the policy to maintain a building's fire and life safety systems, the strength of the beliefs and the evaluation of their importance; that is, how important is the value or worth of the building's safety or the owners' compliance regarding the policy. Values are the evaluation of the features of anything or the ends that are considered desirable of attainment, in this case the safety of buildings. Variables in this study include the worth of taking action, the worth of the regulations or the value of any actions that may be taken. Assessment of the worth of action to meet regulations involves capabilities (e.g. knowledge or technical ability, perceptions of how easy or difficult it is to take action), sense of responsibility and understanding of moral responsibility.

Subjective norms refer to the support from or expectations of other stakeholders for an owner to undertake the behaviour. This could also include the perceived social pressure that the stakeholder may be subject to for them to undertake the action or behavior.

Ajzen's framework suggests that people may have the right attitudes to support the intention to take action to comply (behavioural intention), but there may be other factors (such as context, capabilities, type of policy) which may inhibit or prevent the desired outcome. No previous study has investigated these issues, including what factors influence or inhibit the compliance of owners to undertake the task or behavior, being to maintain a building's fire and life safety systems. This study of the policy that emanated through the complexities of a performance-based building code for the design and construction of buildings, and the capacity for people to take action, being the maintenance of these buildings and the relationship of these variables to actual practices, will now be explored.

Figure 4-1 illustrates the impact of stakeholder awareness and the regulator through policies to determine attitudes, subjective norms and perceived behaviour to eventually influence intention for behavioural change.

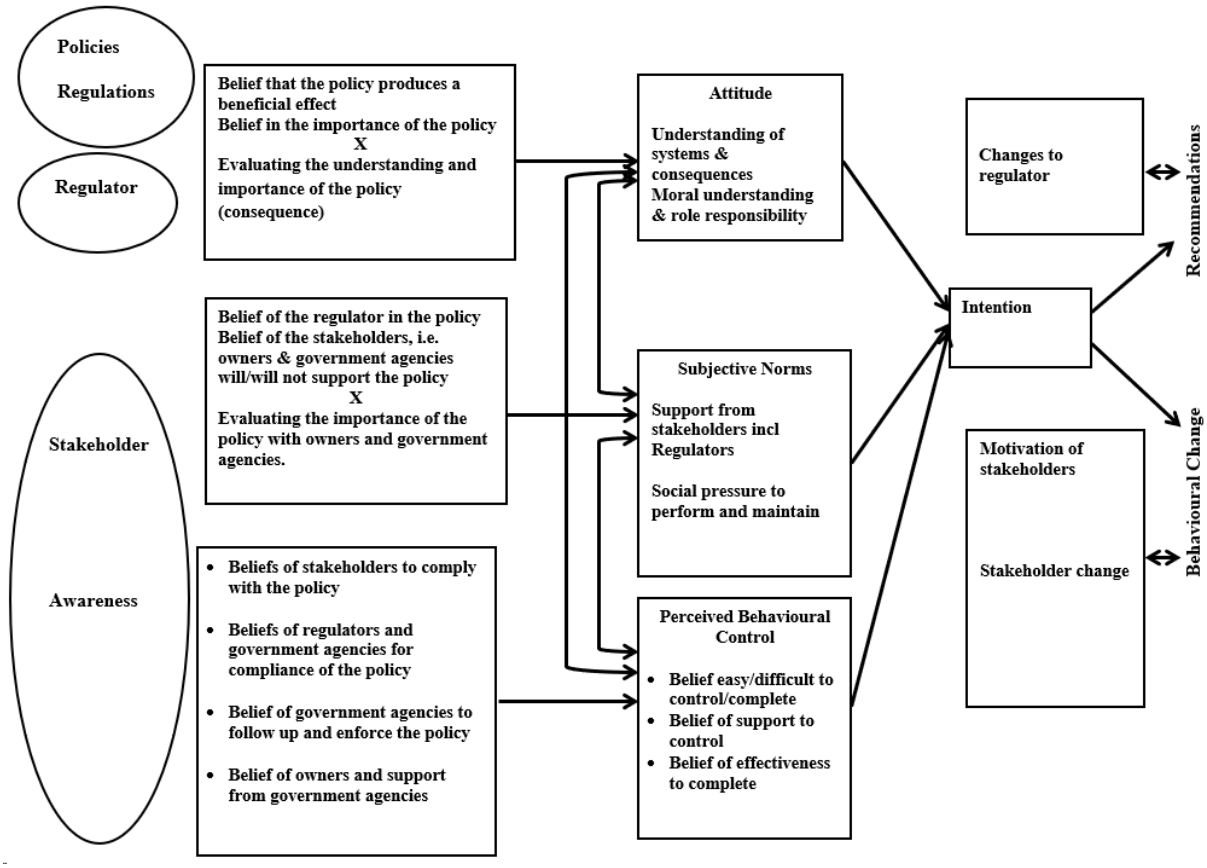


Figure 4-1: Theoretical Framework Adapted from Ajzen (1991)

The theoretical framework proposed is based on the level of compliance of fire and life safety maintenance in multi-storey residential buildings and the level of understanding of an owner's responsibility and their intention for behavioural change determined by compliance with the policy.

This research will determine the statutory maintenance requirements of multi-storey residential apartment buildings versus the actual compliance situation, with the results to indicate the level of understanding of the policy and its translation into practice.

The literature has concluded that the relationship between building owners and owners' corporations and their level of understanding of the maintenance requirements emanating from a fully performance-based building code versus policy implementation and practice appear to be different. This dichotomy was explored to ensure that both the regulator and the building owners' awareness of the risks imposed are not polarising and detrimental to the end result. It could be concluded that this lack of awareness of the policy, including risks, could be enhanced through the establishment of guidelines that can be incorporated into existing owners' corporation obligations to enable buildings to continue to be safe, healthy, functional, compliant and fit for purpose.

This review has proven to be innovative and solves a problem not readily understood by owners' corporations and building owners, by offering a framework to be developed regarding building fire and life safety obligations to allow the translation of policy into practice.

4.3 Research Questions and Hypothesis Development

This study is the first to determine a building owner's intention with respect to maintaining a building's fire and life safety requirement using Ajzen's theoretical framework emanating from the TPB (Ajzen, 1991). This is to determine the efficacy of the TPB for investigating an owner's intention to maintain a building's fire and life safety provisions.

4.3.1 Relationship between Attitude and Intention

Ajzen (2020) Defines attitude as the positive or negative evaluation of an individual's behaviour to modify or undertake specific behaviour. Previous research has shown that attitude directly relates to behavioural intention, in that intention is a crucial pathway and an antecedent for behaviour change (Hassan et al., 2016).

Previous research (Ajzen, 1991) shows that attitude and beliefs about the behaviour and whether it is valued determines the intention to behave. This hypothesis will explore this relationship to determine the intention or otherwise to perform the behaviour in a favourable way. This will be achieved by determining the salient belief that is linked to the behaviour of a certain outcome. Therefore, the positive or negative outcomes to influence a behaviour will be explored through the sum of the

expectation × value towards the behaviour; that is, the attitude toward maintaining fire and life safety provisions for a building. In this study, owners' attitudes will be explored in what is essentially a privatised building system (see section 3.2.1) in which building owners are not aware of their obligations to undertake the act. Therefore, the attitude of the act is unknown and regulators do not have the knowledge to understand the policy (Shergold & Weir, 2018, p. 40; Van der Heijden, 2008; Victorian Auditor-General, 2011). This study will investigate and test the theory that building owners have a positive attitude towards the act (being the policy in this instance) and that intention to do so will result in the intention to undertake the act, being the behaviour. Thus, the following hypothesis is posited.

> *H1: That a positive attitude toward maintaining fire and life safety provisions (through the policy) is positively related to behavioural intention to do so.*

4.3.2 Behavioural Beliefs

Behavioural beliefs can produce an expected outcome or experience. In this instance, the behaviour will be expected to produce a positive or negative result and a favourable/unfavourable experience if building owners understand the policy towards maintaining essential fire and life safety systems, including the consequences of complying or not complying with the policy.

The hypothesis will explore relationships between conducting the behaviour, in this instance carrying out the fire and life safety maintenance; beliefs about the policy, including any beneficial beliefs; importance of the policy; and understanding and consequences or sanctions for noncompliance. Important to the individual are both non-legal and legal sanctions. Non-legal sanctions include feelings of guilt, duty to building occupants and overall consumer safety. Legal sanctions include areas of 'penalties and sanctions' (Smart, 2013; Van der Heijden & de Jong, 2009).

The behavioural belief strength × the outcome evaluation will be explored.

4.3.3 Relationship between Subjective Norms and Intention

Subjective norms are the perceived social pressure to perform the behaviour (intention) of the act. This perceived social pressure can be injunctive or descriptive. An injunctive subjective norm is the pressure from an individual's important referents (family, friends etc.) to undertake or approve to undertake the task, whereas descriptive normative beliefs are whether others who are important to the person undertake the task (Ajzen, 2020). Taken together, subjective norms will influence an individual's intention to engage in the behaviour (Ajzen, 2002; Ajzen & Fishbein, 1980; Bobek et al., 2013). Inspired by (Bobek et al., 2013) as discussed in Chapter 3, significant others such as family, friends, co-workers and regulators through subjective norms can influence behaviour, albeit positive or negative, to achieve regulatory compliance. This study will draw on three important referents to be

measured, the first being family, friends and peers that will have a positive effect on them to influence their behaviour; the second being the regulator, as local and state governments in this study, and where the regulator expects them to comply with the policy and maintain their building's fire and life safety systems; and the third being social pressure to comply with the policy, which will positively influence the act of complying with the policy, provided that they are motivated.

Support from important individuals that positively support maintenance of a building's fire and life safety system and the perceived social pressure to perform the behaviour will be explored through social responsibility × the value of the intention to do so. Therefore, the behaviour to complete the maintenance on a building is more likely to be completed by an owner if they believe that people who are important to them – their referents – think that they should engage in that behaviour.

> *H2: Subjective norms (support from important referents such as family, friends and peers) is positively related to the behavioural intention to do so (to undertake the act).*
>
> *H2.1: That support from the regulator is positively related to the behavioural intention of the act (to undertake the act).*

4.3.4 Normative Beliefs

Normative beliefs are the individual's beliefs in what other significant people believe they should do – in this instance, fire and safety maintenance provisions in their building. Other significant people will include family, peers, work colleagues and the regulator. Further, Ajzen's theory postulates that normative beliefs will lead to subjective norms (Knabe, 2009) and a normative beliefs is that important groups will assist and approve of them to complete the behaviour. This may also be in the acquiring of additional skills and knowledge from the support of others to undertake the behaviour and requires cooperation of others to assist (Ajzen, 2020). In this instance, additional control and assistance, including support in undertaking the behaviour, will be tested by the use of the regulator to assist and support building owners to undertake the behaviour.

4.3.5 Relationship between Perceived Behavioural Control and Intention

Beliefs in the ability to exert control are considered main factors that impede or facilitate a behaviour, thereby influencing the behaviour of the act (Ajzen, 2019). Ajzen (2019) argues that people hold many behavioural beliefs; however, it is the salient beliefs of the individuals that are readily assessable. Further, Ajzen postulates that PBC refers to the ease or otherwise in undertaking the behaviour, in that it refers to peoples' previous experiences that will influence the behaviour. This question therefore seeks to establish the connection between salient beliefs and outcomes. It aims to ascertain the owner's capabilities in executing the behaviour, considering the ease or difficulty of undertaking it. Additionally, the investigation explores the owner's beliefs concerning their capacity

to fulfil the maintenance requirements for the building's fire and life safety systems and their beliefs regarding the available resources for completing the behaviour. A lack of knowledge regarding the policy to maintain a building's fire and life safety provisions will impede or present an obstacle to undertaking the task or intention to undertake the task. This will be tested in the following hypothesis.

> *H3: That perceived behavioural control is positively related to behavioural intention to do so (to undertake the act).*

4.3.6 Control Beliefs

Control beliefs refer to people's perceptions or ability to perform the behaviour (Ajzen, 2006). Each control factor has a perceived power. This variable combines with PBC and is proportional to the control factor. Ajzen's TPB postulates that control beliefs will determine and lead to PBC (Knabe, 2009) and that the more resources people have at their disposal and opportunities that individuals believe that they have, including the lesser the obstacles to complete the behaviour, the greater their control, leading to the PBC. This question will review the intentions of building owners' ability to carry out fire and life safety maintenance if they have done this previously, as this can be the factor that can facilitate or impede the behaviour and will be tested in the next hypothesis.

4.3.7 Relationship between Intention and Behaviour

Ajzen states that intention is an antecedent to actual behaviour (Ajzen, 1991). Therefore, individuals that have a positive and favourable outcome for the act are more likely to engage in the behaviour. The TPB confirms that intention is the strongest motivator to perform the behaviour (the act) and therefore a positive intention and ability to carry out the behaviour, being the maintenance provisions of fire and life safety systems for their multi-storey buildings, will result in compliance with the policy. This study will investigate that a positive relationship with the intention of the act and ability will result in the carrying out of the fire and life safety maintenance requirements. The following hypothesis is proposed.

> *H4: A positive intention and ability to comply with the act is positively related to the behaviour to do so.*

4.3.8 Enforcement of the Policy by the Regulator as the Moderator between Intention and Behaviour

Smart (2013) claims that penalties provide a compliance mechanism (compliance theory) and that compliance with policy can be achieved by providing a significant penalty. According to Ajzen, the TPB can include additional constructs; however, those constructs are required to add to the prediction of the model (1991, p. 199). This has been demonstrated through the theory of reasoned action that

was expanded to include PBC. However, the expansion of the TPB requires additional constructs to improve the quality of the predictive aspects of the behaviour (Ajzen, 2020).

Compliance could be described as two separate areas: outcomes, and the process to undertake such as intervention by the regulator or others (Braithwaite, 2017). To achieve compliance using enforcement mechanisms two styles are considered: the first is catalytic style and the second is coercive style. Catalytic enforcement style is when individuals are motivated – in this instance to ensure compliance with regulatory policy; however, they are not able to achieve compliance due to lack of capacity, knowledge or understanding. Compliance is therefore encouraged through education, technical advice and financial inducement (Weske et al., 2018). Coercive style emphasises sanctions for noncompliance where an individual is placed under pressure to undertake the act (Anderson, 2010; Earnhart & Glicksman, 2015). Further, Smart's (2012) research explores the factors for compliance of tax regimes in New Zealand to test the efficacy of the extension of the TPB to compliance mechanisms, and the following has been developed to determine if punitive action and penalties will result in the behaviour or a catalytic approach will motivate the individual to undertake the act, being to maintain fire and life safety systems on their multi-storey residential apartment buildings.

Building owners will be more likely to comply with the policy if they believe that punitive actions will proceed from the regulator if they do not comply with the policy, and therefore their attitude toward the policy will change. The following hypothesis is proposed.

> *H5: The association between intention and behaviour will be moderated by enforcement of the policy by the regulator such that the association will be significantly stronger when a high level of enforcement is present.*

The independent variables in this study are *attitude*, *subjective norm* and *perceived behavioural control*, and the additional variable to Ajzen's framework in *enforcement of the policy by the regulator*. Figure 4-2 shows the dependency of the variables using the theoretical model by Ajzen that may influence the intention of individuals to undertake the behaviour – in this instance, fire safety maintenance on their building.

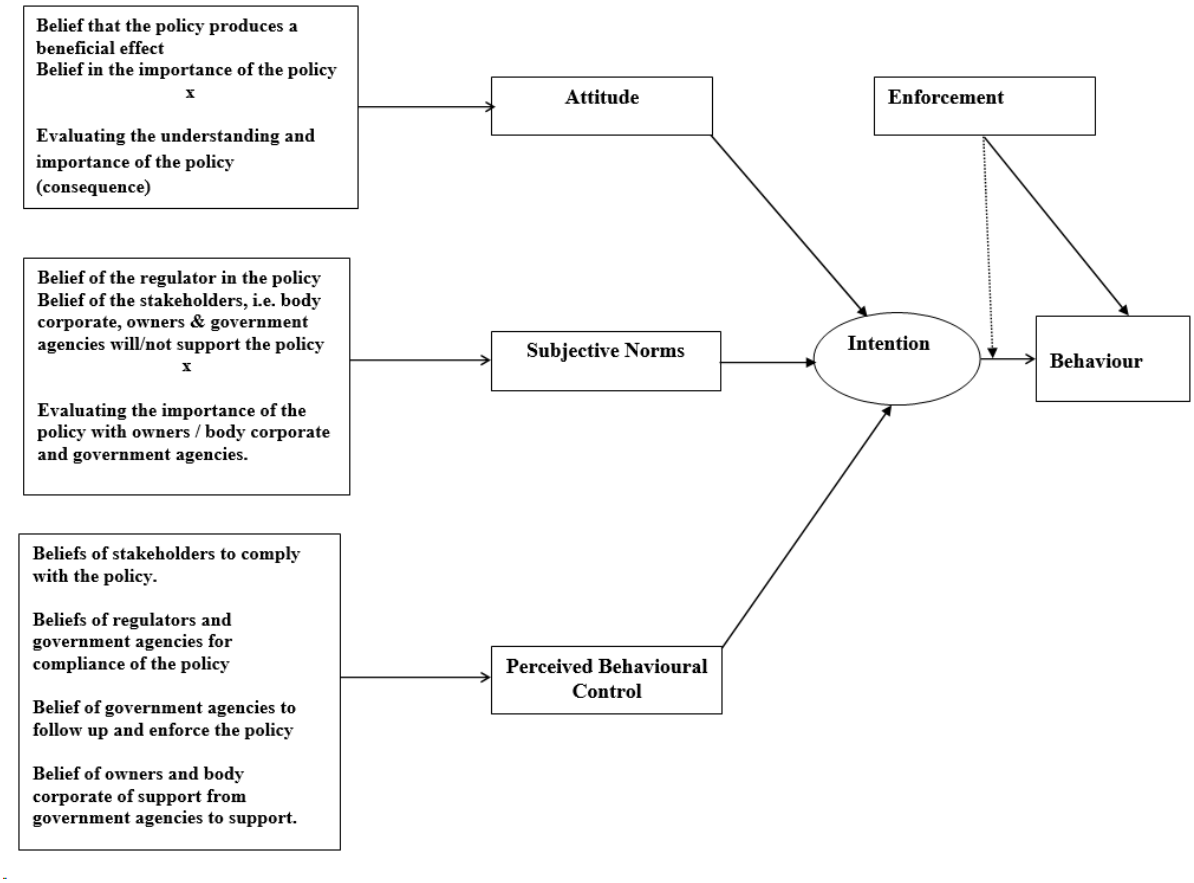


Figure 4-2: Theoretical Research Framework

4.3.9 Is the Theory of Planned Behaviour a Good Fit for this Study?

To assess the suitability of TPB in gauging building owners' intentions to engage in specific acts or behaviours, two primary avenues were explored. The first involved the goodness of fit (GoF) index, while the second will draw insights from existing research. The establishment of the GoF involved the geometric mean based on the averaged R^2 values. Furthermore, the variables' communality, derived from Fornell and Larcker measures, will be used as determined by Henseler et al. (2015) and Tenenhaus et al. (2004). The overall GoF path model relationships for compliance with and without enforcement as a moderator confirm that the model is adequate and supported. As Tenenhaus et al. (2004) suggest, to ensure the quality of the structural model and to take in the model's performance to ensure that it is a good fit for our study, the following hypothesis has been developed.

> *H6: That the TPB is a good fit to establish compliance of the policy regarding ESM maintenance of multi-storey residential buildings.*

4.3.10 Demographic Variables to Predict Compliance with the Policy

The demographic variables used and developed for this study will look at age, gender, position, location (NSW or Victoria) and education level. Although the TPB confirms that demographic variables do not play an important role in the overall prediction of the model, in that they are considered inaccurate predictors of behaviours (Ajzen & Fishbein, 1980), this study will explore the demographic data to test the sample against the survey population to determine if any anomalies exist.

In this study, the demographic variables under consideration encompass age, gender, position, location (NSW or Victoria) and education level. While TPB asserts that demographic variables are generally deemed inaccurate predictors of behaviours (Ajzen & Fishbein, 1980), this research aims to examine these variables to determine if they inhibit the intention and ultimately result in the behaviour. The objective is to assess the sample against the survey population, seeking to identify any potential anomalies or influences within the demographic data.

> *H7: The inclusion of demographic variables (age, education, gender) influences the prediction for compliance of the policy for owners of multi-storey residential buildings.*

4.4 Conclusion

This chapter provided the basis for the theoretical framework and the development of the hypothesis and research questions to be tested. The theoretical framework was discussed to justify its use in this study, including identifying the stakeholders within the theoretical framework. The literature review concluded that there is a stark difference in the relationship between building owners and owners' corporations and their understanding of the statutory responsibilities utilising a fully performance-based building code for the design, construction and maintenance of multi-storey residential apartment buildings. With this established, the use of Ajzen's theory was further explored through the research questions and hypothesis development. The hypothesis constructs were individually explored and further developed, with reference to the theoretical framework where each relationship of the framework was discussed to determine its relevance to the research to enable the theory to be tested.

Inspired by Smart (2013), where Ajzen (2020) confirmed that of the TPB can be expanded, the use of enforcement of the policy by the regulator was added into the framework. Smart's (2013) research was reviewed to determine if enforcement mechanisms, including retribution for noncompliance, add to the compliance of the policy and therefore provide for behaviour change in individuals.

Having discussed the theoretical framework using Ajzen's TPB to determine people's intention for future behaviour and the relevance to this study, which culminated in the final constructs of the theoretical framework to be used, the next chapter will explore the research methodology. This will include formulating the survey questions derived from the literature review, addressing validity and

exploring ethical considerations. Additionally, it will encompass establishing the population and sampling frame, followed by a discussion on the screening and analysis methods to be used in this study.

Chapter 5: Research Methodology

5.1 Introduction

Having discussed the theoretical framework using Ajzen's TPB to determine people's intentions for future behaviour and its relevance to this study in Chapter 4, this Chapter 5 explains the research methodology used in this study.

This chapter includes the objectives and research paradigm principles used (section 5.2) and then provides an overview of the research objectives (section 5.3). Following the research objectives, the research design is discussed (section 5.4), which outlines the findings of the literature (section 5.4.1) then moves to questionnaire development (section 5.4.2) and design (section 5.4.3). The structure of the questionnaire development is discussed in detail (section 5.4.4) and then the relevance and reasons for a pilot study (section 5.4.5) as suggested by Ajzen (2020). The constructs of the questionnaire are further explored based on the methodology adopted (section 5.4.6), which includes both local government authorities to determine the actual compliance rate of the policy and building owners' intentions, including their representatives. The chapter then moves to the research questions (section 5.4.7) and mapping of the questions to the research and theoretical framework. To conclude this section of the chapter, the validity of the content within the questionnaire (section 5.4.8) is discussed to ensure that all measures were addressed, including ethical considerations of this study (section 5.4.9).

The chapter then proceeds to detail the population and sampling frame (section 5.5) used for this study for both local governments and building owners and confirms the number of buildings subject to the policy. This section concludes with detailing the steps taken to address overlap of distribution (section 5.5.4).

The chapter then discusses how the data was analysed (section 5.6) and links the survey to the questionnaire with an explanation of the best approach to be used. Following the analysis, the data screening techniques are discussed, including outliers and sample size to be obtained and the statistical methods to justify their use. The chapter concludes with the methodology of the goodness of fit (GoF) criteria (sections 5.6.1 to 5.6.8).

5.2 Overview of Research Paradigm Principles

A paradigm views the world in a particular way using a framework of assumptions that reflect one's basic beliefs regarding strict guidelines on how particular research should be conducted (Burns & Burns, 2008). Although some researchers suggest that there are two major paradigms in research – positivist (called positivism) and interpretivist (or constructivist) (Burns & Burns, 2008, p. 26) – others discuss more a nuanced examination of choice for researchers, being positivism, post-positivism, critical theory and constructivism (Guba & Lincoln, 1994). Whereas Healy and Perry (2000), discus that there are four different paradigms of research being positivism, critical theory, constructivism and realism. The realism paradigm essentially is implicit in research in that with qualitative research, there are minimal criteria for assessing quality (Healy and Perry, 2000). Deciding on which research method to use, the researcher must choose either qualitative or qualitative approach to achieving the objectives of the study (Hair et al., 2019; Yong et at., 2021).

With two main research methods in use, namely quantitative (positivist) and qualitative (phenomenological or interpretative) (Creswell, 2023; Guba & Lincoln, 1994; Veal, 2005), there are three main forms of research objectives: exploratory, descriptive and explanatory research. Exploratory research aims to uncover new insights and understand emerging phenomena; descriptive research focuses on gathering information about current themes and occurrences; and explanatory research seeks to explain specific issues or problems, ultimately contributing to theory building and elaboration (Rahi, 2017, p. 2).

Researchers, however, are required to understand and comprehend their own beliefs and able to obtain knowledge and understanding of one's own basic beliefs and assumptions on ontology, epistemology, methodology and methods (Rehman & Alharthi, 2016).

Table 5-1 details the belief paradigms in research on ontology, epistemology and methodology.

Table 5-1: Belief Paradigms

	Paradigm			
Item / Belief	**Positivism**	**Post-Positivism**	**Critical Theory**	**Constructivism**
Ontology	Naïve realism (real) reality but apprehend able	Critical realism – Reality is imperfectly understood and can only be grasped probabilistically	Critical realistic – Virtual reality is influenced and moulded by various values	Relativism – Different realities are shaped through various intellectual constructs, rooted in social and experimental contexts and tailored to the specific perspectives
Epistemology	Objectivist; findings true; observed in their natural environment without any manipulation	Modified dualist; critical multiplism; finding of hypothesis	Subjectivist; value-mediated findings	Transactional/ subjectivist: created findings
Methodology	Experimental/ manipulative: verification of hypothesis; chiefly quantitative methods	Modified experimental/ manipulative; in-depth review of results gathered from multiple data sources	Dialogic/ dialectical; genuine awareness and empowerment to facilitate meaningful change	Hermeneutical/ dialectical

Adapted from Guba and Lincoln (1994)

Having discussed beliefs and the different paradigms for research to be completed, it is important to comprehend how they offer an understanding of the problem being investigated (Burns & Burns, 2008). Although different research paradigms will guide the researcher and their view of the way the world operates, choosing the right analysis and research methodology to examine the problem is paramount (Hair et al., 2019). When choosing a research paradigm, several factors must be considered based on previous research and available information. Firstly, determine whether there is a dominant positivist or interpretivist paradigm. Secondly, ensure that the study's aims are clearly defined and select the most suitable paradigm accordingly. Thirdly, assess whether the project is deductive and confirmatory, involving hypothesis testing, or if it employs PLS-SEM techniques to analyse relationships. Finally, consider the researcher's confidence in the methods, the support and training available, and their preference for specific data gathering methods (Yong et al., 2021). Addressing these factors together will help minimise research method bias.

The problem being researched is explained in Chapter 3. However, the aims of the study, being positivism, is considered the most appropriate while exploring the research problem. The study has clear aims and research questions as discussed in Chapter 1. Therefore, it utilises survey to collect data and test the hypotheses to establish significant relationship between independent and dependent variables. Additionally, the data was analysed using partial least squares and structural equation modeling (PLS-SEM) and SPSS to test the path relationships in a research framework. Figure 5-1 details the methodologies and research paradigms that further confirm the research approach adopted.

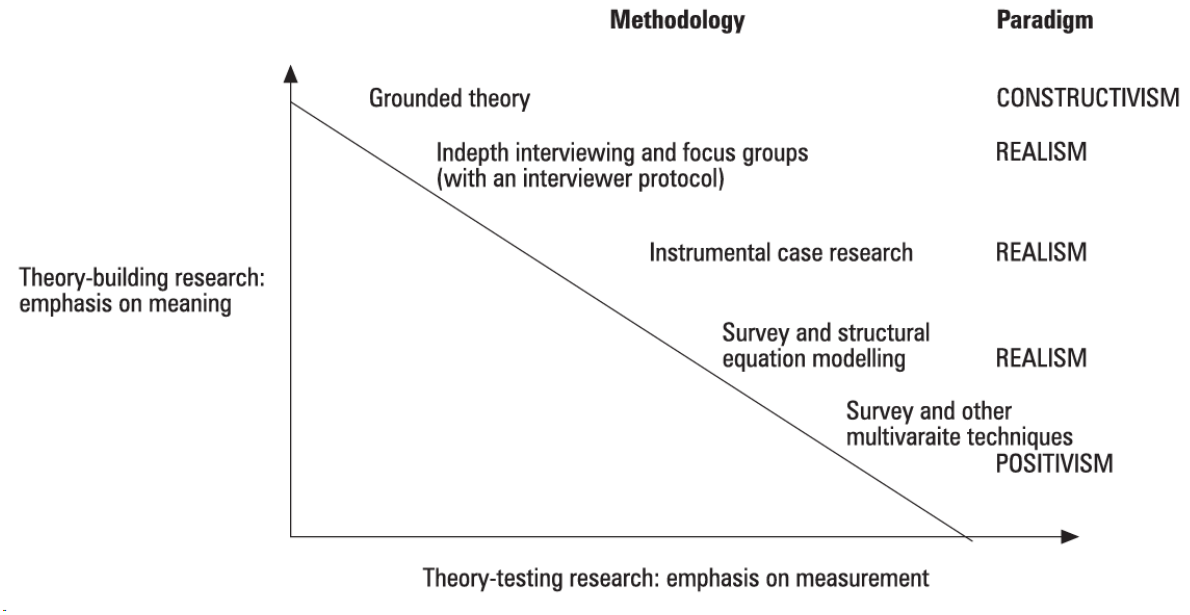


Figure 5-1: Methodologies and Related Paradigms

(Healy & Perry, 2000, p. 121)

5.3 Research Objectives

The objective for this research is to explore the beliefs and intentions of owners of multi-storey residential apartment buildings to maintain their building's fire and life safety provisions over the building's lifespan using Ajzen's TPB. It is envisaged that this framework may be used as a compliance pathway for owners, including strata managers, and the regulator to ensure that multi-storey residential apartment buildings are continuously being maintained in accordance with their occupancy conditions to ensure community safety of the building occupants over the lifespan of the building. Following Smart (2012) suggestion, this study used a moderator variable such as the role of regulator in the enforcement of the policy which is likely to influence the intention on the change of behaviour to comply with the fire safety policy.

As building codes evolve using performance based codes for the design, construction and maintenance of buildings, unsuspecting owners who purchase off-the-plan multi-story residential

apartments face increased financial pressures due to the heavy reliance of active fire and life safety equipment installed. Developers often install complex and bespoke active fire and life safety systems to reduce overall construction costs compared to traditional methods. However, these sophisticated systems require ongoing maintenance throughout the building's life, which would not be necessary with conventional construction methods (Shergold & Weir, 2018; The Centre for International Economics, 2013). Many of these fire and life safety systems are too complex for building owners as well as maintenance personnel to manage effectively, leaving the building occupants at risk in real fire scenarios (Badrock, 2016; Carter, 2019).

5.4 Research Design

With the formulation of the hypotheses detailed in Chapter 4 and the establishment of the theoretical framework (Figure 4-2), the research design has been adjusted to incorporate the below steps in planning and shaping the research method.

This study used a quantitative methodology approach consisting of:

- Literature review
- Survey questionnaire development
- Questionnaire design
- Structure of the questionnaire
- Pilot study
- Construct and distribution of the questionnaire
- Research question development
- Validity
- Ethical considerations

Figure 5-2 details the methodology approach used in this study.

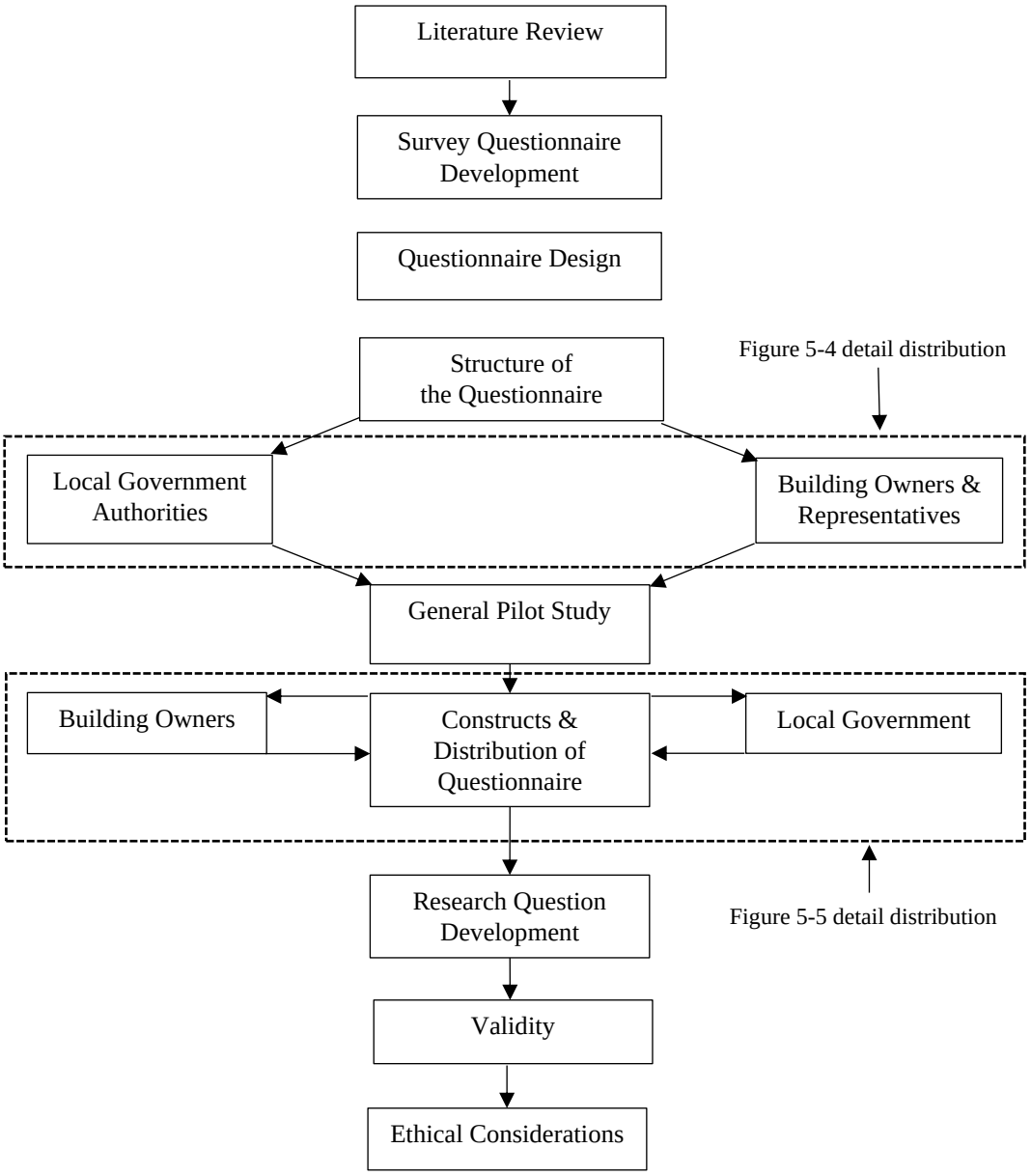


Figure 5-2: Research Design Process

Each of these steps is discussed in detail.

5.4.1 Literature Review

The first part of the design consisted of an extensive review of the literature to ensure that research in this field was captured and considered. This included examination of the literature that was relevant to the research topic, being the extent of statutory maintenance (fire and life safety systems) requirements of multi-storey residential buildings undertaken by building owners and strata managers and their level of understanding of the performance of those systems through a deregulated building policy. The literature review utilised a variety of sources that included Google Scholar and a range of

academic databases to review academic journals such as EbscoHost and Scopus using key words like ‘essential building safety measures’, ‘fire and life safety maintenance’, ‘National Construction Code’, ‘building control’, ‘regulatory enforcement’ and ‘building regulation’ in an Australia context limited until 2021. The review focused mainly on building Acts, regulations and fire safety maintenance policies applicable to NSW and Victoria. In addition, e-books specific to building regulation were sourced and previous government and private research was explored; this allowed for a systematic literature review approach to be undertaken. As suggested by Veal, the literature search was strengthened as it looked to add to the existing body of research and knowledge as the researcher needs to be fully aware of the knowledge base (2005, p. 77). As the author has comprehensive knowledge and experience of the subject matter in a professional setting, this has enhanced the literature search.

Some researchers (Arditi & Nawakorawit, 1999) have concluded that companies, including building owners, should plan their maintenance programs to accommodate the corporate goals of the company. In addition, the insurance industry suggests that commercial building owners who have access to and maintain their buildings through adequate maintenance records are likely to benefit from lower insurance premiums (Productivity Commission, 2004, p. 72). This is also true for insurance companies who may not be aware of the implications of a fully performance-based building code on the building’s fire and life safety systems and are unable to assess the appropriate risk for this approach to the design, approval and construction of multi-storey residential buildings (Productivity Commission, 2004). The literature concluded that owners would benefit from lower insurance premiums and assistance by understanding the policy requirements to maintain their building’s fire and life safety systems. This conclusion will be tested in the online questionnaire to building owners and owners’ corporations. The literature also pointed to the noncompliance and maintenance regimes of commercial buildings, with some regulators confirming that there is a lack of effective monitoring and evaluating of buildings (Auditor-General of New South Wales, 2022; Construct NSW, 2021; van der Pump & Scheepbouwer, 2023; Victorian Auditor-General, 2011). This essentially will review and confirm the compliance of multi-storey residential apartment buildings in NSW and Victoria.

5.4.2 Survey Questionnaire Development

Having completed the literature review, the next step involved undertaking a quantitative research method to determine the actual level of compliance of the fire and life safety maintenance regimes for multi-storey residential buildings in Victoria and NSW. This was undertaken to confirm the fact that building owners and their representatives do not undertake or understand fire and life safety maintenance requirements as prescribed by the conditions to occupy their multi-storey residential buildings. NSW and Victoria were chosen for this study, as NSW contains just under half of all

apartments in Australia (46%), with Victoria having almost a quarter (23%) (Australian Bureau of Statistics, 2022). Therefore, NSW and Victoria represent a total of 69% of all apartments nationally.

The problem identified from the literature is that company policies do not appear to be clear or provide direct links to strategic objectives for their built assets (Jones & Sharp, 2007), with building maintenance considered a 'necessary evil' that increases costs for companies (Chew et al., 2004) and building owners alike. This appears to be equally true for building owners and their representatives who manage these highly sophisticated buildings, encompassing bespoke fire and life safety systems installed in a predominantly privatised building regulatory regime.

Online questionnaires generally target specific groups of people that are computer literate and have access to the internet. The concept of online surveys can produce quick and cost-effective results (Veal, 2005) and real-time outcomes that are securely stored for accessibility and analysis. The rise of the internet as an online communication tool has transformed research and research methods generally, as links to surveys can be sent via e-mail or directly through the internet (Bell et al., 2018). Unfortunately, the increased rate of online questionnaires has created survey fatigue among participants (Lavrakas, 2008) that contributes to lower than expected responses from participants or perfunctory answers. To combat this phenomenon, the following strategies were incorporated to elicit careful, considered and accurate responses, as recommended by Van Selm and Jankowski (2006): sending pre-notification to prospective respondents; ensuring that anonymity is well secured and detailed at the onset of the questionnaire; multiple attempts to contact potential respondents through existing networking groups and professional organisations; sending reminders; and ensuring that the survey topic is relevant to the groups (Van Selm & Jankowski, 2006). The survey was also designed to engage the respondent from the beginning to be interesting, easy to complete, within their sphere of knowledge and understanding and with clear, defined goals (Brace, 2018).

Online questionnaires allow for easier and instantaneous quantified outcomes and results that are increasingly being used in business research studies (Sreejesh et al., 2014; Van Selm & Jankowski, 2006). It is acknowledged that the frequency at which companies and others receive online survey requests competing for online customer input may dilute the enthusiasm of respondents (Van Selm & Jankowski, 2006); however, to overcome these scenarios, the researcher contacted specific industry forums and existing links with professional organisations to explain the research, such as the Australian Institute of Building Surveyors (AIBS), being the main industry body in Australia representing building surveyors in line with measures as outlined above using the recommendations of Van Selm and Jankowski (2006). Online surveys are the preferred method of delivery for questionnaires, with prospective respondents simply needing to click onto the specified website and complete the questionnaire; this method allows for real-time data to be extrapolated that can be easily

analysed by software (Veal, 2005). In addition, self-completion surveys provide greater certainty to the respondent when completing (Brace, 2018).

5.4.3 Questionnaire Design

The design of the questionnaire was carefully considered and adapted to ensure all the objectives were clear, as suggested by Veal (2005). The survey questionnaire utilised existing previous studies in similar fields (Horner et al., 1997; Productivity Commission, 2004; Shergold & Weir, 2018; Van der Heijden, 2008) that researched building enforcement, maintenance and regulatory goals. In addition, Ajzen's (2002) sample questions and concepts were also considered to ensure that the questionnaire responded to the framework. The questions were then mapped out against the theoretical framework and objectives, as the research questions are subjective in nature and had to respond to beliefs, subjective norms and attitudes to ensure there were no gaps, as recommended by Sekaran and Bougie (2016). Input was received by research supervisors at Victoria University who provided critical assessment, with several suggested changes implemented to ensure that the questionnaire contained academic rigour and remained responsive to the framework. See Table 5-5 for the mapping of research questions to the theoretical framework.

Due to the technical nature of the policy that governs maintenance of fire and life safety systems for multi-storey residential buildings, a definitions section was provided at the commencement of the questionnaire to remove any potential ambiguity. This ensured consistency of terms such as 'policy', being the governing regulations for the maintenance of fire and safety systems in multi-storey residential apartment buildings, and 'essential fire safety features' or measures, as each state and territory in Australia has differing titles and definitions. In addition to the definitions section, the questionnaire provided background details, confirming that confidentiality of all responses will be maintained, with a statement confirming that "*at no stage will individual names, companies, corporate entities, or councils be identified*".

5.4.4 Structure of the Questionnaire

There are two sets of questionnaires that each consist of two sections, A and B. The first questionnaire was sent to local government and the second to building owners, owner corporations, strata managers, including their representatives, and industry groups. The construct of each questionnaire is discussed below.

The questionnaire to local government consists of 11 questions for Part A and 9 questions with a total of 47 individual items for Part B. The questionnaire to building owners and owners' corporations consists of 10 questions for Part A and 14 questions with 74 items for Part B. The items that measured the TPB variables used a 5-point Likert scale with 1 being 'strongly disagree', 2 being 'disagree', 3

being ‘neither disagree or agree’, 4 being ‘agree’ and 5 being ‘strongly agree’. The 5-point Likert scale was proven by Fishbein and Ajzen (2010) as a reliable method of measuring individuals’ views and beliefs. Additionally, the 5-point Likert scale was adopted from recommendations from supervisors, as this was seen as being adequate to gauge the participants’ responses and also to reduce user fatigue (Lavrakas, 2008) when completing the questionnaire, in addition to making it easier and simpler for the end user. There also appears to be minimal difference between a 5-point Likert scale and a 7-point Likert scale once re-scaled (Dawes, 2008). Open-ended questions were also adopted to elicit more replies (Van Selm & Jankowski, 2006), with greater detail and in-depth responses, as opposed to closed questions that illicit single responses (Krosnick, 1999). The questionnaires were developed to provide a range of open and closed questions, dependant on the information being sought.

An information sheet was developed to accompany the online questionnaire that clearly explained the purpose of the study and the importance of participation. It clearly explained the research, the definitions outlined in the survey, what would be asked, what participants would gain, potential risks of participating and how the project would be conducted. In addition, contact details were provided if participants required further information, including the main supervisor at Victoria University and the researcher. Additional information was also provided that if participants had further concerns or complaints regarding the survey, they could contact the independent Ethics Secretary at Victoria University. A participation information sheet on university letterhead was attached to further allay any fears regarding participation in the survey, including re-confirming that all responses would remain anonymous. The participant information sheet was developed for all areas of the questionnaire. Refer to Appendix C for copies of the participant information sheet.

5.4.5 Pilot Study

Ajzen (2019) discusses the requirements for pilot questionnaires to also include measures of any background factors or other variables that may be of interest in addition to eliciting salient outcomes for direct measures of attitude, subjective norm and perceived behavioural control. Once the draft of the questionnaire was developed, the draft was sent to several different council building departments for their inputs, including the national technical and policy section of AIBS. The AIBS was selected as they are the main industry association that represents building surveyors across Australia. Building surveyors have the statutory responsibility to approve and inspect construction of multi-storey residential apartment buildings throughout Australia, including nominating the fire and life systems to be maintained over the life of the building.

The input from the pilot study and feedback received were taken into consideration and updated into the final questionnaire. This version of the questionnaire was entered into Qualtrics, an online

platform for distribution and collection of questionnaire. Prior to the final questionnaire being sent out, a second questionnaire was sent to several colleagues in local government to ensure that changes made in the questionnaire were clearly understood and accepted by the target audience. Feedback was again received that the questionnaire was easy to follow and to complete. Minor amendments in the final version of the questionnaire included the time required to complete the questionnaire, the ability to go back to certain questions to review selections and amendment if required, and a thankyou note at the end for taking the survey.

Figure 5-3 shows the design development process of the survey questionnaire.

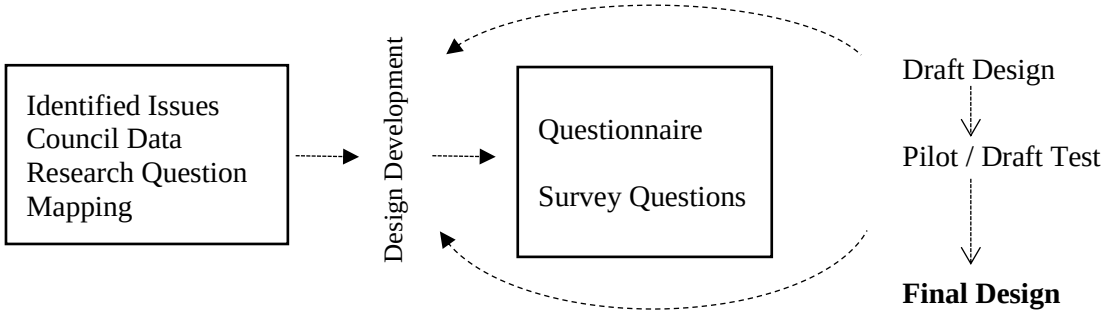


Figure 5-3: Survey Process

5.4.6 Constructs and Distribution of the Questionnaire

Local Governments

A number of phases for implementation of the questionnaire were undertaken to ensure that an adequate response rate was achieved. The first phase of the online questionnaire was sent to local government building departments in Victoria and NSW (for this research, the 'regulators'). This involved collecting primary data based on their fire safety system audit and compliance registers for multi-storey residential buildings within their municipality. The data was then analysed to determine the actual level of compliance with the policy from building owners and owners' corporations. Only major or inner-city councils in NSW were selected for this study that were known to contain multi-storey residential apartments, whereas in Victoria an e-mail invite was sent to every council municipal building surveyor via an industry organisation, the Victorian Municipal Building Surveyors Group (VMBSG, a third party) that had contacts for each municipal council building department (see section 5.5 for details regarding local governments).

The online council questionnaire is divided into two distinct sections, A and B. Section A seeks information regarding demographic data, such as level of education, position and council activities regarding statutory obligations such as:

- the number of buildings that are subject to the policy
- the building's use and classification
- the number of buildings inspected/audited
- the number of compliant inspections
- the number of compliant buildings
- the perceived understanding of the role of the regulator to achieve compliance.

The second section of data collection for local government building departments is section B. The section B questions are based on Ajzen's framework to determine attitudes, subjective norms and perceived behaviour to influence intention of behavioural change and the level of understanding of the policy. Although this data sourced from local government is not publicly available, access was provided through existing relationships with industry groups and freedom of information procedures.

Upon confirming council building department participation, an online link generated through Qualtrics was sent via e-mail. Qualtrics is a website that helps researchers to design, develop, distribute and collect responses in SPSS format.

The primary data collection method in Part A involved an online questionnaire, yielding figures for assessing policy compliance, comparing regulations to industry practices and gauging participation (section B).

The obtained data serves as quantitative evidence regarding the adherence to fire and life safety provisions in building maintenance. It assesses the understanding of policy among building owners. Additionally, it determines the extent to which buildings align with policy objectives and legislative requirements in NSW and Victoria to determine the translation of policy to practice, as discussed in Chapter 2.

Copies of the online questionnaires, including the participant information sheet, and consent form, are attached in Appendix D.

The first e-mail questionnaire was sent to all Victorian local government building departments using existing industry links to distribute the survey. In addition to this distribution method, a number of inner-city councils were also individually approached (refer to Appendix F.1 for copies of the e-mail sent to Victorian councils).

In NSW, councils were contacted individually via phone in the first instance to enable a direct conversation with the building or fire safety department to discuss the survey questionnaire and to gain their direct e-mail address (refer to section 5.5 for details of population and sampling frame). Unfortunately, and unlike Victoria, there was no one industry group like the Victorian Municipal Building Surveyors Group that could easily reach each local government building departments, therefore, each selected Council were individually contacted. This strategy did not prove successful, as most of the council reception officers would not transfer calls to their building or fire safety department staff. E-mails however were then subsequently sent to the selected councils after the initial telephone contact and were addressed to the building or fire safety department for a response. Three additional follow up e-mails were then sent, to ensure that an adequate number of responses were obtained (refer to Table 5-2). See Appendix F.2 for detailed lists of NSW councils contacted, including dates of requests sent. Figure 5-4 details the distribution method.

Table 5-2: Total Council Requests

Total Responses	**No.**	**Phone Calls**	**1st Request**	**2nd Request**	**3rd Request**	**Total Requests**
NSW	37	37	37	14	15	66
Victoria	*78	*	*78	*78	–	156
Total Requests						**222**

*Note: Request sent out to all Victorian council building departments via the VMBSG

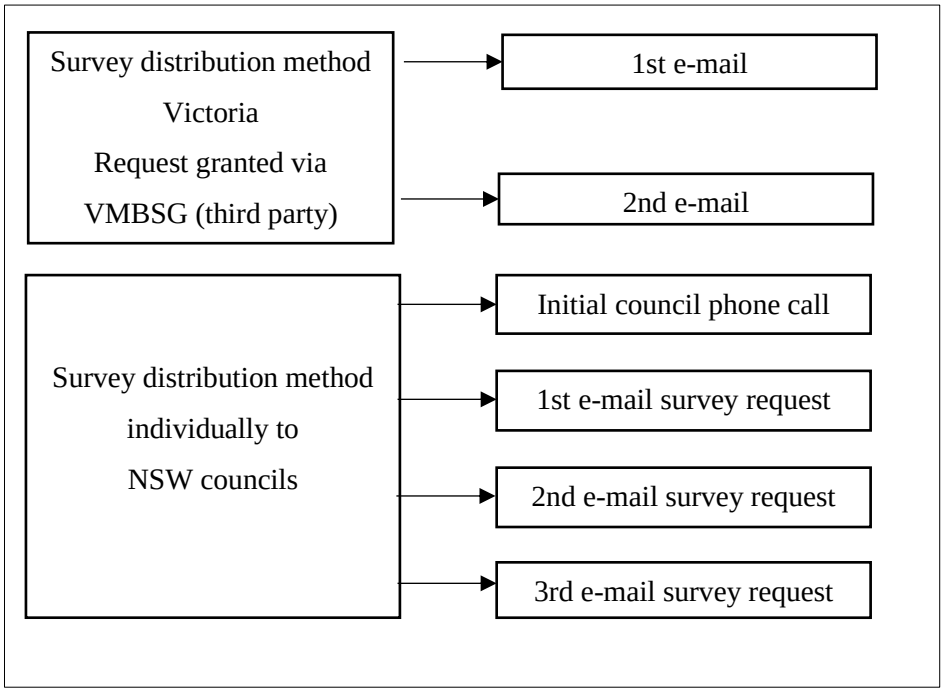


Figure 5-4: First Phase Questionnaire Distribution

Building Owners

The second phase of the study involved sending an online questionnaire to building owners, owners' corporations, strata managers, industry associates and groups that own or manage or undertake maintenance on multi-storey residential buildings. Only building owners, strata managers and industry associations that have extensive property portfolios were chosen. As with local government authorities, strata managers were selected based on their location and that were known to have multi-storey residential apartment buildings (see section 5.5 for additional details). The online questionnaire is again in two sections, A and B. Section A of the questionnaire firstly ascertained demographic information regarding the respondent and then further information regarding their building and its characteristics, including the number of storeys, the number of occupants and individual units involved, to determine if they respondents were aware of the policy to maintain their building's fire and life safety systems.

The next part of the questionnaire, section B, is based on Ajzen's framework to determine attitudes, subjective norms and perceived behaviour to influence their intention of behavioural change and the level of understanding that they perceive of the policy. The results were measured on a 5-point scale as previously discussed and were analysed using SPSS frequencies to produce responses.

The online questionnaire ascertained the attitudes, subjective norms and perceived behavioural control of the participants to then form part of Ajzen's framework. Copies of the online questionnaire to

building owners and their representatives are attached in Appendix D, as well as copies of the questionnaires to strata managers, industry associates and regulators.

The questionnaire was distributed to major strata management companies overseeing multi-storey residential apartment buildings in NSW and Victoria. A decision was made early in the research to contact strata managers in the first instance directly, as they manage the majority of multi-storey residential apartment buildings on behalf of owners, nationally. The Strata Community Association of NSW website and the Strata Community Association of Victoria website were used to compile a list of strata companies along with their contact details. Subsequently, individual strata companies were contacted by phone to inform them about the research study and to request their approval for sending an email containing a link to the online questionnaire (Fricker & Schonlau, 2002; Veal, 2005). A total of 165 strata management companies were contacted initially by phone to seek their support in completing the online survey. As this process was very time-consuming, with each response being anonymous, four separate e-mail requests were made in addition to the initial phone calls to elicit a response. A total of 340 multiple requests were sent to strata management companies in NSW and Victoria (Table 5-3). See Appendix F.4 for copies of requests sent to strata management companies.

Table 5-3: Total Requests to Strata Managers

Strata Managers	No.	Phone Calls	1st Request	2nd Request	3rd Request	4th Request	Total Requests
NSW	97	97	77	63	38	13	191
Victoria	68	68	50	38	33	28	149
Total Delivered	**165**	**165**	**127**	**101**	**71**	**41**	**340**

*Note: Denotes total, unscreened responses. Refer below for total screened responses.

The survey was also distributed to members of the Property Owners Association of NSW through their existing networks across the state via their member links. Further requests were made to the Whirlpool Forums Australian discussion board, which received 451 individual views, and the Chevron Residential Apartments, which reached 300 apartment owners in that complex through their online request system (Table 5-4).

Table 5-4: Organisations Contacted Through Online Forums

Organisation	Reach/Views
Whirlpool Australian discussion forum	451
Chevron Residential Apartments forum	300
Total	**751**

The discussion forums were utilised, as these dealt directly with building owners to gain their opinions and understanding of the policy to determine the efficacy of Ajzen's TPB. The reach or views on the discussion threads via these forums was 751; however, the actual completion of the survey by building owners through these forums was limited and will be discussed in Chapter 6. Using the online forums allowed for further building owners to be approached and contributed to the actual reach of the questionnaire to ensure the opportunities for building owners to participate in the survey as much as possible. Figure 5-5 shows the detailed distribution method.

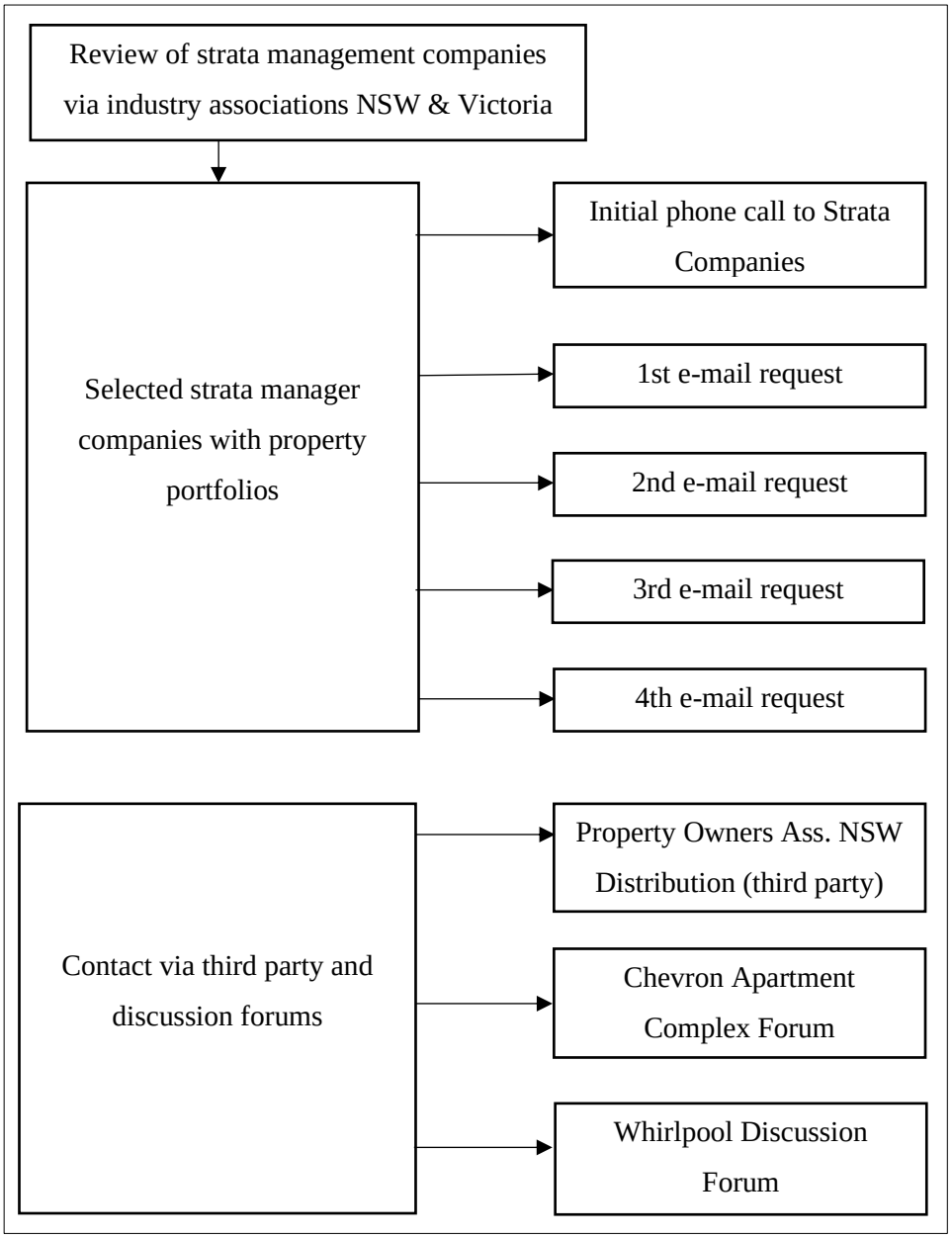


Figure 5-5: Second Phase Questionnaire Distribution

Having covered the research design and methodology, which encompasses survey distribution and data collection techniques, the following section will discuss the examination of the research questions. This includes the mapping of question constructs to the underlying theoretical framework.

5.4.7 Research Questions

The research question that has been identified from the literature is:

> *To what extent do the constructs within the theory of planned behaviour (attitude, subjective norm and perceived behavioural control) influence the intention of building owners*, companies *and owners' corporations that own multi-storey residential apartment buildings to maintain the fire and life safety systems in their respective buildings?*
>
> *How is policy implemented in practice within a deregulated building regulation environment to ensure compliance of statutory maintenance for building owners and companies including owners' corporations that own multi-storey residential apartment buildings in NSW and Victoria?*
>
> *To what extent do penalties provide a compliance mechanism (compliance theory) regarding a building owner's obligations to maintain their building's fire and life safety provisions?*
>
> *Is the TPB a good fit to establish a building owner's intention to carry out statutory maintenance on their respective multi-storey residential apartment building?*
>
> *Do demographic variables contribute to undertaking the intention to carry out statutory maintenance on multi-storey residential apartment buildings?*

Having regard to the research questions as detailed above, the next phase mapped the research questions to the theoretical framework by Ajzen to ensure that all the constructs were captured. Table 5-5 shows the constructs of the framework against the research questions.

Table 5-5: Mapping of the Questions to the Framework

Research Question	No.	Hypothesis	No. of Items	Theory / Reference / Author
To what extent do the constructs within the theory of planned behaviour (attitude, subjective norm and perceived behavioural control) influence the intention of building owners, companies and owners' corporations that own multi-storey residential apartment buildings to maintain the fire and life safety systems in their respective buildings? *How is policy implemented in practice within a deregulated building regulation environment to ensure compliance of statutory maintenance for building owners and companies including owners' corporations that own multi-storey residential buildings in NSW and Victoria?*	H1	A positive attitude toward maintaining fire and life safety provisions (through the policy) is positively related to behavioural intention to do so.	10	Ajzen (1991)
	H2	Subjective norms (support from important referents being, family, friends and peers) is positively related to the behavioural intention to do so (to undertake the act).	8	Ajzen (1991) La Barbera and Ajzen (2020)
	H2.1	That support from the regulator is positively related to the behavioural intention of the act (to undertake the act).	4	Ajzen (1991) Braithwaite (2017) Van der Heijden (2011)
	H3	That perceived behavioural control is positively related to behavioural intention to do so (to undertake the act).	7	Ajzen (1991) La Barbera and Ajzen (2020)
	H4	A positive intention and ability to comply with the act is positively related to the behaviour to do so.	3	Ajzen (1991) Hassan et al. (2016)
To what extent do penalties provide a compliance mechanism (compliance theory) regarding a building owner's obligations to maintain their building's fire and life safety provisions?	H5	The association between intention and behaviour will be moderated by enforcement of the policy by the regulator such that the association will be significantly stronger when a high level of enforcement is present.	4	Smart (2012) Ajzen (1991)
Is the TPB a good fit to establish a building owner's intention to carry out statutory maintenance on their respective multi-storey residential apartment building?	H6	That the TPB is a good fit to establish compliance of the policy regarding ESM maintenance of multi-storey residential buildings.	All	Ajzen (1991) Henseler et al. (2015) Tenenhaus et al. (2004)
Do demographic variables contribute to undertaking the intention to carry out statutory maintenance on multi-storey residential apartment buildings?	H7	The inclusion of demographic variables (age, education, gender) influences the prediction for compliance of the policy for owners of multi-storey residential buildings.	5	Ajzen and Fishbein (1980) Ajzen (1991)

Following the exploration of the research questions and their alignment with the question constructs and theoretical framework, the next stage will address the validation of the research questionnaire and address the ethical considerations in the questionnaire development process.

5.4.8 Validity

To ensure the validity of the content within the questionnaire, and to ensure that all measures were adequately addressed against the constructs of framework, the questionnaires were referred to supervisors (professors) at Victoria University. Several changes and additions were made to ensure that the survey responded adequately to the framework and research objectives. Similarly, mapping of the questions against the framework were also conducted to ensure that the revised survey questions responded to the framework and objectives of the theoretical framework. Refer to Table 5-5 for the mapping.

After the supervisors were satisfied with the changes and mapping of the framework was complete, the questionnaire was sent to several industry representatives for feedback. Once feedback was received, the survey questions were revised for clarity and to minimise ambiguity and the survey was sent to a technical expert within the AIBS (2022) to ensure the questions were relevant against each state's building policies, being NSW and Victoria. After receiving feedback, minor changes were made for clarity and to remove any ambiguity for the respondent. A final test pilot study was sent to several industry respondents. Minimal recommendations were provided, and after discussions with the supervisors at Victoria University it was felt that the questionnaire responded to the theoretical research framework and the objectives and was therefore suitable for the formal survey to the respondents after ethics approval was granted by Victoria University.

5.4.9 Ethical Considerations

All research that involves human participants must gain ethics approval from the Victoria University Human Research Ethics Committee (VUHREC) prior to any research being commenced. As this study involves human participants, ethics approval from Victoria University was required. An application was developed in accordance with the Human Research Ethics guidelines and submitted for approval to VUHREC, and approval was granted. Refer to Appendix E for the ethics approval from VUHREC.

In accordance with the guidelines provided by VUHREC, an information sheet was developed via the standard form provided by Victoria University (VU-HREA Application Information for the Participants Involved in Research). This information sheet was attached to all questionnaires to provide further information and clarification regarding the questionnaire for the participant, including relevant contact details if they wished to lodge a complaint or gain further information.

In addition to the information sheet, a formal consent process was included at the commencement of the questionnaire; this allowed participants to either accept or decline to answer the questionnaire. If participants declined, they were redirected from the online questionnaire process. This provided for informed consent to be detailed and documented prior to participants undertaking the questionnaire. A detailed explanation was provided at the commencement of the survey to inform participants of the survey and research, including that all information provided will be treated strictly confidential. All surveys and information sheets to participants were approved by Victoria University Ethics Committee prior to the release of the questionnaire to participants. Refer to Appendix C for the Information to Participants Involved in Research and Appendix E for the ethics approval notification.

After addressing the measures taken to validate the research questionnaire and uphold ethical standards, the next section of this chapter discusses the population and sampling frame to justify and detail the approach taken for this study.

5.5 Population and Sampling Frame

5.5.1 Local Government Population

Victoria

According to the Local Government Association of Victoria, there are 79 municipalities within the state (Municipal Association of Victoria, 2023). Given this extensive number of local governments to contact individually, it was decided to utilise the resources of the Victorian Municipal Building Surveyors Group (VMBSG) to distribute the questionnaire. The VMBSG is the main industry association for local government building surveyors, of whom the vast majority of council building departments are members (Victorian Municipal Building Surveyors Group, 2022). The VMBSG regularly delivers correspondence via e-mails to all councils and their members, being local government building departments. The VMBSG therefore were contacted and permission was granted for them to distribute the questionnaire to all council building departments in Victoria. While it is acknowledged that the questionnaire would only be applicable to councils who have multi-storey residential apartment buildings within their municipal area, the questionnaire would be distributed to all councils regardless of whether they had multi-storey residential apartments, and a review of the results concluded that only councils that contained these buildings responded (refer to Appendix F.1 for copies of the e-mail sent to Victorian councils by the VMBSG).

Now that the Victorian council building departments populations and sampling is established, the next stage is to determine the sample of local governments in NSW.

New South Wales

NSW contains 128 individual local governments (Local Government NSW, 2023). Given the extensive number of individual councils to contact, a different approach was utilised to elicit a response, compared to Victoria where distribution of the survey was through the VMBSG. To identify the suitable local governments to engage with, a series of steps were undertaken, considering that not all municipal council jurisdictions encompass multi-storey residential apartment buildings within their boundaries.

Having established the total number of local governments in NSW, an initial desktop review of each council was undertaken to ensure that only those councils containing multi-storey residential apartment were contacted to take part in this study. This was achieved in several ways – firstly by reviewing Google maps via satellite, then by reviewing individual council websites, and finally, by discussions with personnel with detailed knowledge of the municipal area. The relevant personnel selected were from the Australian Institute of Building Surveyors (AIBS) as this is the leading professional body representing building surveying practitioners in Australia, recognised both nationally and internationally. This organisation had the existing local connections with building surveyors in NSW, including those in local government. It was, therefore, deemed the most suitable organisation to advise on the relevant local governments to contact.

This review reduced the 128 NSW local government authorities (councils) to 38 (see Table 5-6). Refer to Appendix F.2 for detailed lists of NSW councils contacted.

Table 5-6: Number of Councils Contacted

State	Local Governments Contacted
Victoria	78
NSW	38
Total	**116**

Interestingly, from the results of the survey and feedback received, the actual number and extent of multi-storey residential apartment buildings within any local government area in both NSW and Victoria could not be fully established. This was mainly due to the data collection methodology deployed by each council, as the database in each local government area could not establish or identify the actual number of separate apartment buildings. As the actual number of multi-storey residential apartment buildings were not able to be fully ascertained, an approximate number was sought via the survey questions to establish an approximate number of buildings.

Having established the population and sampling frame to be used for local government authorities, the next stage determined the extent of multi-storey residential apartment buildings in NSW and Victoria. This assessment facilitated the determination of the overall building population, enabling the establishment of an appropriate sampling frame.

5.5.2 Total Number of Multi-Storey Residential Apartments in NSW and Victoria

As discussed in Chapter 2, according to the 2021 census data, approximately 2.6 million people now live in apartments in Australia (Australian Bureau of Statistics, 2021), of which 47% are located in NSW and 23% in Victoria. However, the actual number of multi-storey residential apartment buildings could not be established; therefore, to determine the number of multi-storey residential apartment buildings that are subject to the policy the data from the 2021 census was utilised.

The census confirmed that there were 993,503 apartments that contain three or more storeys; however, no further breakdown was reported. As the census confirmed that 47% apartments are in NSW and 23% in Victoria, for a total of 70% of all multi-storey residential apartments, these percentages will be used to generate approximate numbers. This yields 695,454 individual apartments located in NSW and Victoria that are three or more storeys in height (Table 5-7).

Table 5-7: Number of Apartment Units

Multi-Storey Apartments (3 or more storeys in height)	No.	Percentage
Total national individual units	993,503	100%
Total NSW and Victoria individual units	695,454	70%

The response from the survey questionnaire resulted in 36,726 individual buildings being identified. It is noted however that this number is approximately 5% of the total individual apartments, not separate buildings containing a number of individual apartments as detailed in the 2021 census data (Table 5-8).

Table 5-8: Number of Apartment Buildings

Separate Buildings Containing Apartments	No.	Percentage
Total NSW and Victoria	36,726	5%

The data from the survey questionnaire however is far greater than the 5% of the total individual apartments from the 2021 census. The survey questionnaire completed by local government conveyed

the number of individual buildings that contain apartments. As there are multiple apartments within medium and high-rise residential apartment blocks – that is, not individual apartments – the figure of 36,726 individual apartment buildings is therefore greatly exceeded. It should be noted that the figures from the census are not a truly reliable representation of the actual number of buildings containing apartments, but rather a reference of sample size. This thesis is analysing apartment blocks or separate buildings, as the fire and life safety measures apply to the actual buildings, not necessarily individual residential apartments contained within those buildings. This information is far more difficult to obtain, as referenced by the local government authorities charged with ensuring compliance with fire and life safety maintenance of those apartment buildings, as they could not ascertain the actual number of buildings within their municipal district. Therefore, this study is the first to review this concept of fire and life safety of multi-storey residential apartment buildings and will add significantly to the understanding of ensuring community safety of residents living in those buildings.

Having discussed the local government population and sampling frame, including establishing the number of buildings subject to the policy and the response from the survey to form part of the analysis, the next part will discuss the population of building owners and their representatives, including strata managers, and the source of information gathered.

5.5.3 Building Owners and Strata Managers – Population

The next data collection phase of this study involved contacting building owners, owners' corporations and strata managers in NSW and Victoria. A request was sent to the Strata Community Association of Victoria and NSW to seek their assistance to distribute the questionnaire to their membership (refer to Appendix F.6 for e-mail requests to the Strata Community Association NSW and Victoria). The Strata Community Association NSW has over 3000 members that oversee, advise on or manage over 750,000 individual lots in NSW (Strata Community Association NSW, 2022), whereas the Strata Community Association Victoria has 831 memberships, including 357 managers, 96 services, 100 affiliates and 278 principal members (Strata Community Association Vic, 2002). Therefore, this group is the largest organisation of strata managers with memberships across Australia.

Unfortunately, the request for the strata community associations to distribute the survey was declined; however, a full list of strata companies along with their contact details was obtained from their respective websites. As per council contact details, a selected list of Victorian and NSW strata management companies was obtained from the strata association websites and the list reduced to only include locations and suburbs where the strata companies were located, and the areas known to contain multi-storey residential apartment buildings (refer to Appendix F.3 for NSW and Victorian strata management company distribution lists).

In addition to the strata managers associations of Victoria and NSW, contact was made with the Property Owners Association of NSW. The Property Owners Association of NSW is the peak body for property owners who own residential accommodation in NSW (landlords). It collectively represents approximately 96% of all property owners in NSW (Property Owners Association NSW, 2022). The request to distribute the survey was approved and sent through their respective membership base via e-mail notification to people that own or manage multi-storey residential apartment buildings in NSW on 24 October 2022, accompanied by a participant information sheet regarding the research and online links directly to the online questionnaire (refer to Appendix F.9 for and confirmation of distribution).

In addition to the Property Owners Association of NSW, a request was also sent to the Whirlpool Forums Australian discussion website for permission to post a survey on their national platform, which was granted. Whirlpool is a national online discussion forum that has over 909,847 registered members and over 3,829,708 threads (Whirlpool, 2023). The request was subsequently approved and posted to the discussion forum under the Real Estate thread titled 'Increasing Cost of Maintaining Apartment Buildings', along with a participant information sheet and a website link directly to the survey (refer to Appendix F.8 for the online forum).

Following on from the Whirlpool forum posting, the Chevron Residential Apartments complex via their online building management portal was also approached to seek approval to contact individual apartment via their building management portal. The Chevron apartment complex is a number of detached multi-storey residential apartment towers housing over 300 individual apartments (The Age, 2004). This request to submit the questionnaire to the individual building owners was approved and subsequently posted to their portal (see Appendix F.7). Additional requests were sent to the Owners Corporation Network of Australia; this organisation represents strata owners who manage residential apartment buildings – however, the request to send out to their membership base in NSW and Victoria was declined (refer to Appendix F.5). The Property Institute of Australia was also contacted to request their support to distribute to their membership base in the residential apartment area; however, this request was also subsequently declined.

Table 5-9 details all organisations and requests made to building owners and their representatives, including local government distribution.

Table 5-9: Organisations Contacted in NSW and Victoria

Name of Organisation	Comments	Appendix
Victorian council distribution request	Request sent to all Victorian council building departments	Appendix F.1
NSW council survey distribution list	Request sent to selected NSW council building and fire safety departments	Appendix F.2
Victorian strata management companies distribution list	Request sent to selected strata management companies in Victoria	Appendix F.3a
NSW strata management companies distribution	Request sent to selected strata management companies in NSW	Appendix F.3b
E-mails to strata management companies	Copy of e-mail requests sent to strata management companies	Appendix F.4
Owners Corporation Network	This organisation represents strata owners in NSW; copy of e-mail request sent including information regarding research	Appendix F.5
Strata Community Association, NSW and Victoria	This organisation represents building owners in NSW and Victoria. This is a national organisation, however only the NSW and Victorian states were contacted. Copy of e-mail request sent including information regarding research.	Appendix F.6
Chevron apartment complex online distribution	Online distribution request delivered to a number of separate multi-storey residential apartment buildings in Melbourne via their private management platform	Appendix F.7
Whirlpool national online real-estate forum	Online distribution request posted via an online real estate forum via Whirlpool	Appendix F.8
Property Owners Association of NSW	Distributed to all members of the Property Owners Association of NSW who account collectively for 96% of all property owners in NSW	Appendix F.9

As the distribution of the survey went to numerous organisations and industry associations, the issues associated with dissemination was considered early in the process and will now be discussed.

5.5.4 Dissemination of Surveys

To combat the issues associated with dissemination of surveyors and its overlap with individuals and strata management companies, strata managers were approached in the first instance. Strata managers, through their company set-ups, are engaged by owners' corporations, who are collectively the owners and governing body of their strata schemes, to manage their buildings. Building owners are automatically made part of the governing body of their building (strata scheme) when they purchase a

lot and are responsible in law to maintain their building (Crommelin et al., 2021), including fire and life safety provisions. In NSW and Victoria, there are distinct legislative frameworks governing owners' corporations. In Victoria the *Owners Corporation Act 2006* (Vic) requires owners' corporations to manage and oversee building maintenance and repairs, whereas in NSW the *Strata Schemes Development Act 2015* (NSW) and the *Strata Schemes Management Act 2015* (NSW) govern owners' corporations and their responsibilities. However, despite the differences in the legislation of these two states, NSW and Victoria share similar requirements aimed at preserving the fire and life safety features of their buildings. The responsibility for ensuring compliance with these requirements falls on strata managers, who are appointed by owners' corporations. This obligation, mandated by the relevant strata management Acts, stands in contrast to building legislation, which holds owners accountable for maintaining fire and life safety provisions in their buildings, not strata managers. Failure to comply may result in severe fines, emphasising the commitment to community safety. It is important to note that strata managers oversee multiple buildings, rather than individual lots within the building. This distinction minimises the likelihood of overlap among strata management companies.

The details of the strata companies approached were gained from the strata associations in NSW and Victoria; these along with other organisations as listed in Table 5-9 were approached. However, overlap of buildings is considered minimal if any, as only one strata management company oversees individual buildings.

Having detailed the population and sampling frame, including managing overlap of distribution, the next part of this chapter will detail the screening techniques employed to cleanse the data, enabling a comprehensive analysis to take place. Following this, the SEM techniques to be used will be discussed, along with why PLS-SEM was chosen for the purposes of this study. The final parts of this chapter will discuss the methodology and selection of the sample size to ensure the validity of responses and response rate required to enable the analysis to be undertaken using SPSS and PLS-SEM. The GoF analysis will be discussed and whether this is a suitable indicator for this study while using PLS-SEM and the accepted values to be used.

5.6 Analysis

The data was processed and analysed using statistical analysis. This stage involved three main areas as described by Hair et al. (2011): screening of responses, evaluation of the measurement model and assessment of the structural model. The screening of the data entailed undertaking a preliminary checking of data, and sampling adequacy, including outliers and normality.

The next stage was to assess the constructs and their items. This was undertaken with the use of SPSS to determine the variables and their respective relationships via multivariate analysis as recommended by Hair et al. (2021). Factor loading, reliability and validity were undertaken with the data analysis essentially involving the use of both SPSS and PLS-SEM. Structural model assessments, using SmartPLS 4.0, involved checking path coefficients, their significant relationships and, the predictive power of the model.

5.6.1 Screening of Data and Outliers

The subsequent phase involved data screening and outlier detection, a prerequisite for any analysis (Veal, 2005). Data preparation encompasses several steps aimed at minimising potential issues and correcting them before proceeding with the analysis (Kline, 2015). Furthermore, identifying participants who did not complete the survey is crucial to ensuring the reliability of the findings (DeSimone et al., 2015). This process involved undertaking a preliminary analysis check for output concerns, assumption testing and sampling adequacy (Field, 2013). The data was scrutinised for respondent errors, mistakes including outliers, normalities and patterns, including easily identifiable anomalies (Hair, 2009; Meyers et al., 2016; Sreejesh et al., 2014).

The initial checks were completed in two stages. First, a review of the data in Qualtrics was conducted to get a feel for the information and identify any major anomalies (Sekaran & Bougie, 2016). Then, the data was transferred from the Qualtrics Survey platform directly into SPSS via electronic transfer, allowing responses to be saved directly into SPSS. Qualtrics is a cloud computing or software package delivered and managed remotely by more than one provider that allows anyone with a computer to access the questionnaire at any time, allowing the researcher to concentrate on the delivery of the online survey (Baker, 2013), as opposed to other manual post surveyors. Qualtrics was selected not only because it is the main university-supported platform for conducting questionnaires, but also due to its superiority over other online survey tools like Survey Monkey in terms of dimension, clarity, and overall strength (Rea et al., 2022). Once the data was in SPSS, the next stage involved screening the files for errors and clarity to ensure there were no out-of-range values or outliers (Coakes & Steed, 2009; Hair, Black, et al., 2019). During this screening stage, some responses were found to be missing significant amounts of data. Data screening and failed responses occur when respondents do not complete the survey instrument and questions (Hair, 2009). As the questionnaire consisted of two different sets – one to local governments and the second to property owners, owners' corporations and their representatives, with the questionnaire being in two parts, the first being demographic and compliance requirements and the second concentrating on Ajzen's theoretical framework – each set underwent individual screening before being combined for analysis. Detailed data screening, including the identification of outliers and response rates, will be further discussed in Chapter 6.

Having discussed the preliminary screening techniques used in this study, including further detailed screening of the data to occur in Chapter 6, the next stage of this chapter will discuss and justify through previous research the sample size used. Following the sample size, the SEM techniques used to further screen the data, including the analysis, will be discussed.

5.6.2 Sample Size for Analysis

The issue of sample size is a moot point. While some scholars recommend sample sizes of a minimum of 100 (Quintana & Maxwell, 1999), other scholars recommend sample sizes much larger (Hair, 2009). However, Fowler Jr (2014) suggests that a sample size does not have to be large; rather, sample sizes can range from 30 to 460 cases (Kline, 2015, p. 16) or from 30 to 500 depending on the type of analysis and types of data (Sekaran, 2003) in order to gain meaningful patterns (Wolf et al., 2013). Other scholars suggest the N:q rule – the ratio of cases (N) to the number of model parameters (q), being 10 times (Kline, 2015). Interestingly, Fowler Jr (2014, p. 38) discusses that "*a sample size of 150 people will describe a population of 15,000 or 15 million with virtually the same degree of accuracy, assuming that all other aspects of the sample design and sampling procedures are the same*". Using this analogy, for this study to determine an appropriate number of multi-storey apartment buildings, the 2021 census confirmed that 2.6 million people live in apartments (Australian Bureau of Statistics, 2021) and that 47% were located in NSW and 23% in Victoria (Australian Bureau of Statistics, 2022). Therefore, when combined with Victoria and NSW, the approximate number of multi-storey buildings would be 18,200 apartment buildings, thereby providing an adequate level of sample size. As the number of buildings subject to the policy will be maintained, administered or managed by multiple companies and representatives, the actual individual survey responses needed would be far less in order to gain the actual number of multi-storey apartment buildings. The number of buildings captured in this study exceeds these parameters, with owners, strata managers and regulators providing the data and completion of the survey; therefore, this meets the criteria according to Fowler (2014). Further, Quintana and Maxwell (1999) argue that sample sizes perform adequately with 100 participants, and in multivariate research it is recommended that the sample should be several times the size of the variables (Sekaran, 2003). Using the rule of thumb as described by Sekaran (2003, p. 295) in accordance with the theoretical framework variables as discussed in Chapter 4 and shown in Figure 4.2, the minimum number of responses required would be 30. However, for a small and medium sized model, 100–150 responses (Kline, 2015; Schumacker & Lomax, 2004, p. 115) should be adequate.

5.6.3 Response Bias Analysis

A response bias analysis was undertaken to ensure that the quality of the responses was maintained by comparing the first initial responders with those of second and subsequent responders (Armstrong &

Overton, 1977). This test was undertaken using SPSS via the use of Levene's test for equality of variance (Gaur & Gaur, 2006). This analysis is further discussed in Chapter 6.

5.6.4 Outlier Assessment

Outliers are the results of extreme values or data errors than can affect and distort the mean and standard deviation. Outliers should be found and either explained, deleted or accommodated (Kline, 2015; Schumacker & Lomax, 2004). To determine outliers in this study, the Mahalanobis distance (D^2) will be used. This test determines the distance to the centroid to the remaining cases and the means of variables (Tabachnick & Fidell, 2011). It will be undertaken using SPSS.

5.6.5 Normality Assessment

To ensure the results were not skewed, a normality assessment was completed to determine if the results were evenly distributed or identified as high or low values. This involved undertaking a skewness and kurtosis test using SmartPLS 4.0 to ensure that the data and deviation did not affect the result with the distribution shape being examined (Kline, 2015). This step is particularly important because serious effects can occur in smaller sample sizes (Hair, Black, et al., 2019).

Skewness and kurtosis are used to describe the characteristics of the distribution, including mean and deviation (Groeneveld & Meeden, 1984; Joanes & Gill, 1998). Skewness is the measure of or the distribution of the values spread horizontally where the value can be positive, negative or zero or undefined; however, values should be within the range of –1 to +1 to be considered normal and anything outside these values indicates a substantial distribution (Hair, Risher, et al., 2019; Lewis-Beck et al., 2004). A positive skew means that most of the scores are below the mean and a negative skew indicates most of the scores are above the mean (Kline, 2015). Kurtosis on the other hand is the measure of the peakedness or flatness regarding the distribution, where a positive value (leptokurtic) is considered a peaked distribution and a negative value (platykurtic) indicates a flat distribution (Hair, Black, et al., 2019). The value of kurtosis should be within the range of –3 to +3 for a normal distribution (Lewis-Beck et al., 2004). A positive result shows a kurtosis with a heavier tail and higher peak, where as a negative result shows a kurtoses with a slender tail and lower peak (Kline, 2015). The results of the normality assessment are detailed in Chapter 6.

5.6.6 Structural Equation Modeling

To enable the hypothesis to be tested, structural equation modeling (SEM) was used. SEM is an advanced multivariate statistical technique to calculate and analyse relationships. Essentially, SEM was developed from a combination of path and factor analysis (Meldrum, 2010). SEM is capable of testing complex modeling and is the preferred method for testing path models (Schumacker & Lomax, 2004). It has the ability to estimate separate but interdependent equations simultaneously (Hair,

Black, et al., 2019). Therefore, SEM was selected to determine the interdependencies of the variables to evaluate the hypotheses.

PLS-SEM is particularly suitable for smaller sample sizes due to its ability to provide accurate estimates for path analysis, including both direct and indirect effects (Aburumman et al., 2022; Hair & Alamer, 2022; Hair et al., 2022; Wong, 2013). This approach has been widely adopted in various research fields such as behavioural sciences, marketing, management information, and business strategy to test the theory(Wong, 2013). Moreover, PLS-SEM can accommodate models with moderating variables as demonstrated by Ramayah et al. (2018). Given that a theoretical research model including a moderating variable (enforcement of the policy), PLS-SEM is an appropriate choice for a smaller sample size.

5.6.7 Bootstrapping

Bootstrapping was initially developed in the 1970s and is essentially a computer-based resampling of data (Kline, 2015). Bootstrapping refers to a statistical method that is based on building a sampling distribution for a statistic by resampling from the data that you have (Schumacker & Lomax, 2004; Sekaran & Bougie, 2016). It is essentially a re-sampling procedure within SEM which makes an assessment of the sample data (Hair, Black, et al., 2019) that involves the t-test to review and examine the estimates and whether they will be significantly different, to enable conclusions to be drawn. The computer models the sampling many times over, which simulates random sampling with replacement (Kline, 2015) and validates the model by using a large sample number and then combines them in order to determine the best fit coefficients (Hair, Black, et al., 2019). Bootstrapping was analysed in the first instance to determine confidence levels.

5.6.8 Goodness of Fit

The analysis of this study used partial least squares structural equation modeling (PLS-SEM). The assessment of the model was conducted in two stage processes to ensure that the measurement model was suitable; these were the measurement model and the structural model, as detailed by Hair et al. (2021). According to Tenenhaus et al. (2005) and Hair et al. (2021), PLS is not suitable for model validation; however, the indices can help to assess the path model and assist to explain the data and can be used to estimate relationships between variables using small sample size (Henseler & Sarstedt, 2013, p. 566).

GoF under SEM looks at compatibility of the model regarding the data and strength of the constructs (Quintana & Maxwell, 1999). It is intended to extend the TPB to include additional constructs (i.e., moderator) for enforcement of the policy to review determinants such as fines and penalties issued by the regulator that may improve and influence intentions and subsequently behaviour change.

Therefore, without enforcement of the regulations pertaining to ongoing fire safety maintenance, the intent of the BCA to ensure that buildings are safe and fit for purpose for ongoing use will not be delivered (Productivity Commission, 2004) (refer to section 4.3.8 and H8).

Hair, et al. (2019) discusses that GoF essentially indicates how well the theoretical structure is represented by the data (Henseler & Sarstedt, 2013). Firstly, the chi-square (χ^2) is used to measure the differences between the observed and estimated covariance matrices. Therefore, in SEM we need to see a *p* value of (> .05) that would indicate no statistically significant difference. The GoF reviews the overall fit of the model.

5.7 Conclusion

The chapter commenced with an overview of the research paradigms that provided an analysis on why this research was based on a positivist approach, as the study involved quantitative data analysis through PLS-SEM to determine the theory. The research questions were then confirmed from the literature and related back to the conceptional framework, demonstrating the constructs, questions and relevance to the questionnaire. The research design process described the quantitative approach adopted and demonstrated in the survey design process through mapping of the questionnaires to the theoretical framework of Ajzen and that the research questions provide rigour in their design, including the pilot study of the questionnaires (Table 5-5). The population and sampling frame detailed the methodology used to determine the samples and provided and justified the extensive list of organisations approached, including details of all contacts (Table 5-9), which demonstrated that every conceivable effort was made to elicit responses. It is considered that the extensive contacts through industry associations and organisations provided a saturation point regarding responses.

The assessment method chosen to ensure validity of the questions demonstrated a preliminary screening process that was defined through existing research methodology. From this, it was important to clarify the sample size requirements based on previous studies that related the actual number of multi-storey residential apartment buildings in NSW and Victoria using recent 2022 census data available through the ABS. Following this, the research methodology and modeling requirements and methods were discussed, including the GoF criteria to be used for the analysis.

Having discussed the research methodology used, the next chapter will detail the results of the questionnaire developed throughout chapters 4 and 5. The results will be discussed, with some analysis and screening of the results provided.

Chapter 6: Results

6.1 Introduction

This chapter presents the results of the study that determines the efficacy of Ajzen's TPB regarding the policy to maintain a building's fire and life safety systems for multi-storey residential apartment buildings.

The study's results are presented and analysed systematically, employing both SPSS and SmartPLS4, structured into four key sections: survey results, response screening, data screening and analysis, and model evaluation, including the assessment of moderation interaction effects.

The chapter begins with an introduction (section 6.1) and then moves on to the results of the survey, being the assessment of the current policy performance (section 6.2), including data collection and results, detailing the performance and compliance of the policy, demographic characteristics of the responses (sections 6.2.1 to 6.2.7) and the response rate of the questionnaire (section 6.2.8).

Section 6.3 provides the screening of the responses applied to the survey, elucidating the analysis and data collection methodology of the responses and undertaking the non-response bias test (section 6.3.3) and the common method variance test (section 6.3.4).

Section 6.4 provides an in-depth screening of the data confirming the outlier assessment of the responses (section 6.4.1), then undertakes the examination of data using normality assessment to determine the skewness and kurtosis deviation for each construct (section 6.4.2); multicollinearity tests to determine the correlation between variables (section 6.4.3); reliability and validity tests to determine the consistency of the responses (section 6.4.4); and convergent validity to ensure that there is an acceptable variance between the constructs (section 6.4.5). The final step to determine the assessment model is the discriminant validity assessment (section 6.4.6) to ensure that the variables differ from each other in that they are discriminately loaded into their respective constructs. This section then concludes by discussing the reliability and validity of the chosen model (section 6.4.7).

Section 6.5 focuses on evaluation of the model and encompasses additional collinearity tests (section 6.5.1) and confirms the significance of the TPB relationships within the path model (section 6.5.2). The chapter meticulously outlines the path model and path coefficients with their significance level. The explanatory power of the model (section 6.5.3) and the predictive power on effect size is determined (section 6.5.4). Moreover, this section addresses enforcement as a moderating effect using the interaction of moderators and antecedents (sections 6.5.5 and 6.5.6).

Section 6.5.7 details the results of the GoF criteria used in this study with the path relationships detailed, followed by the demographic variables results related to the study (section 6.5.8).

The conclusive and final outcomes of the model are presented in section 6.6, followed by a comprehensive conclusion and summary of the chapter's results (section 6.7).

6.2 Assessment of Current Policy Performance

6.2.1 NSW and Victorian Results

Out of a total of 115 councils approached to complete the survey, 82 responses were received that provided a response rate of 71%, which exceeds the normal online survey response rate of 44.1% (Meng-Jia et al., 2022). See Appendix F.2 for detailed lists of NSW councils contacted, including dates of requests sent.

6.2.2 Data Screening – Local Government Responses

Once the survey was completed through Qualtrics, an electronic platform to collect responses, the first step of data analysis was to screen the data for outliers, missing data and general errors (Hair, Black, et al., 2019). The purpose of data screening is to ensure that there are no input errors, missing values or identical responses (i.e. choosing one option in the Likert scale) that can be problematic when trying to undertake an analysis (Burns & Burns, 2008). Data screening was only initially undertaken when the survey responses were uploaded into SPSS. A view of the data displayed the missing entries, including no entries or general errors. Where there were missing entries or observed errors, those individual survey responses were removed. Of the 82 recorded responses from local government authorities, 30 were removed due to incomplete data or responses. This left a total of 52 workable responses. Of the 52 workable responses, 34 or 68% were from Victoria and 18 or 35% from NSW (Table 6-1).

Table 6-1: Total Council Responses

Total Responses	No.	Total Requests Made	Final Screened Responses	%
NSW	37	66	18	35%
Victoria	*78	156	34	65%
Total Requests	**115**	**222**	**52**	**100%**

*Note: Request sent out to all Victorian council building departments via the VMBSG.
Not all contain multi-storey residential apartment buildings within their municipal district.

Given the lower number of usable responses from local government in NSW and Victoria, it was established that many council officers completed Part A of the survey but struggled to complete Part B. This reduced list of usable responses appears to be largely from a lack of data regarding multi-storey residential apartment buildings within their individual municipality that council officers did not appear to or want to disclose. This in addition to the added complexity and perceived relevance of Ajzen's theory to building technical staff regarding Part B of the survey contributed to the missing data within those responses.

Having considered the response rate and missing data particularly in Part B of the survey that dealt with Ajzen's theory, it was determined that this part was essentially not required and did not contribute significantly to any meaningful value. It was thus deemed unnecessary.

6.2.3 Clarification of Survey Results – Local Government

As discussed in section 5.5, the actual number of individual apartment buildings could not be established. It is therefore noted that it would be beneficial for each council to understand their statutory requirement to administer the policy to maintain fire and life safety provisions of multi-storey residential apartment buildings within their municipality and have available the actual number of buildings that are subject to the policy. This will assist each council to provide the necessary resources and plan for the management of the risks associated with those buildings to ensure the community safety of the residents who reside in those buildings.

Although the number of usable responses from councils across the two states was 52, the actual number of multi-storey residential apartment buildings that are subject to this survey was estimated at 36,726 (see Table 5-8). Given that local government is responsible for administering building policy through regulation regarding compliance or otherwise of fire safety of existing multi-storey residential apartment buildings, this number is highly skewed to inner-city municipalities having the majority of buildings to administer. The seemingly high number of buildings that local governments are responsible for is consistent with their statutory management requirement under the building regulations.

6.2.4 Demographic Characteristics – Local Government

Following from the clarification of results as described above, the next part of the chapter will present the demographic characteristics of local government officers that responded to the survey.

Of the total responses, 10% identified as a council technical officer, 69% identified as a council building surveyor, 4% identified as a building maintenance manager and 17% did not provide a role for their position.

The questionnaire asked a series of demographic questions, including academic qualifications of the council officers completing the questionnaire. Of the total responses, 8% did not disclose education qualifications, 2% completed Year 12, 8% achieved a Vocational Education and Training (VET) diploma or equivalent, 23% had a VET advanced diploma, 6% had an associate degree, 15% had an undergraduate degree, 27% had achieved a postgraduate diploma and 12% had obtained a master's degree (refer to Table 6-2).

Table 6-2: Total Responses, Including Demographic, and Number of Buildings Subjected to the Policy

Characteristic	Item	Frequency (n = 52)
State	NSW	37%
	Victoria	63%
Representative	Building surveyor	69%
	Buildings maintenance manager	4%
	Technical officer	10%
	Other	17%
Education	Secondary school	2%
	VET sector diploma	8%
	VET sector advanced diploma	23%
	Associate degree	6%
	Undergraduate degree	15%
	Postgraduate diploma	27%
	Master's degree	12%
	Other	8%
Number of Buildings	NSW	89%
	Victoria	11%

Having presented the survey results including the number of buildings that are subject to the policy, including the demographic characteristics of the council employees who are charged with the administration and enforcement of the policy, the next stage of the results will discuss and determine the actual compliance of the policy with the regulation.

6.2.5 Compliance with the Policy

To determine the actual compliance rate of the policy, the questionnaire then asked respondents, being council employees, what they believe the number of compliant multi-storey residential apartment buildings is within their municipality. The total responses were 18,094 or 55% for NSW and 585 or 15% for Victoria. Table 6-3 and Figure 6-1 show detailed numbers.

Table 6-3: Perceived Compliance with the Policy

Jurisdiction	Total Buildings	Compliant Buildings	%
NSW	32,810	18,059	55%
Victoria	3,916	585	15%

The large number of perceived compliance properties with the policy in NSW appears to be mainly due to their mandatory registrations and yearly maintenance certificates that are required to be submitted to local governments stating that their building's fire safety and essential maintenance services have been completed in the previous year. See Chapter 2 and Appendix A for specific details on regulatory requirements pertaining to fire and life safety maintenance requirements for multi-storey residential apartment buildings in NSW and Victoria.

As the number of buildings that are subject to the policy has been determined, the questionnaire then asked how many fire safety compliance inspections were undertaken in the preceeding year. The totals were 612 for NSW and 964 for Victoria (Table 6-4 and Figure 6-1).

Table 6-4: Number of Inspections Carried Out

Jurisdiction	No.
NSW	612
Victoria	964
Total	**1576**

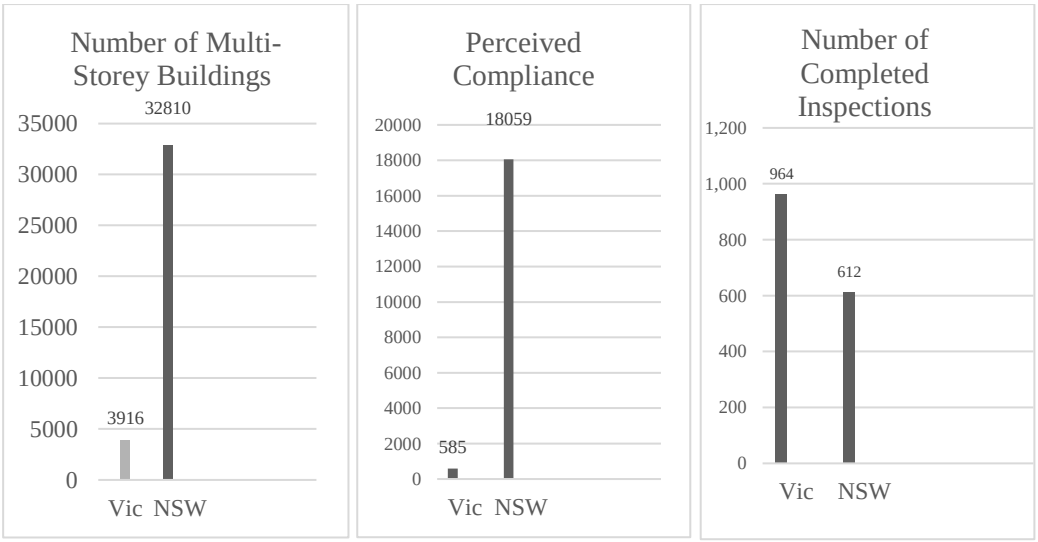


Figure 6-1: Details of Multi-Storey Buildings

The next question asked, of those buildings inspected in the preceding year, what was the actual compliance rate of the buildings with the policy. For NSW, of the 612 buildings inspected 220 or 36% were found to be compliant with the policy, as compared to Victoria where the results were, of the 964 buildings inspected, 127 or 13% were found to be compliant with the policy (Table 6-5 and Figure 6-2).

These results indicate that the policy does not have an adequate compliance rate to ensure community safety for residents in these buildings.

Table 6-5: Percentage of Actual Compliant Buildings

Actual Compliant Buildings Inspected	Total Compliant	Total Inspected	Actual Compliance
NSW	220	612	36%
Victoria	127	964	13%

Figure 6-2 shows details of actual compliance with the policy in NSW and Victoria.

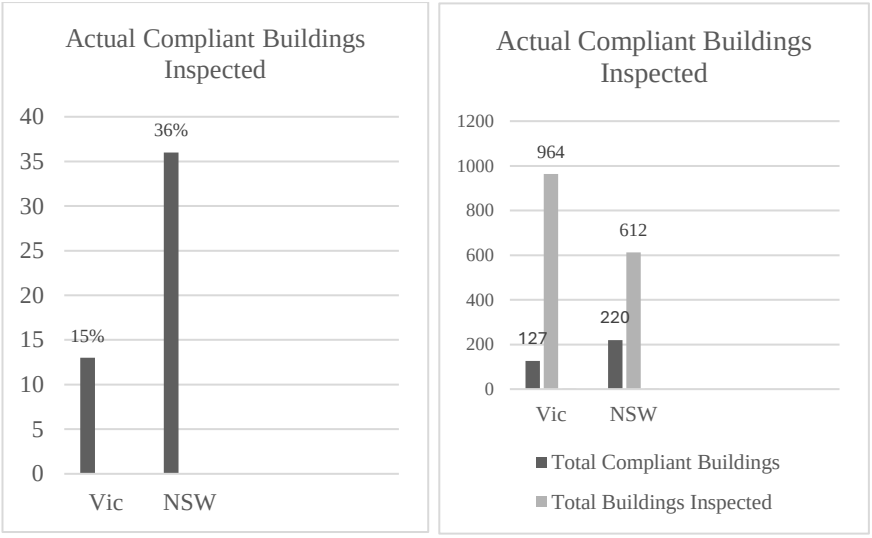


Figure 6-2: Actual Compliance in Victoria and NSW

Of the 52 responses from council employees, only 29 or 56% confirmed that their council has a policy (either formal or informal) for managing essential fire safety measures or fire safety systems for multi-storey residential buildings in their municipality in both NSW and Victoria.

Having discussed the NSW and Victorian response rates, including demographic details, I will now discuss Part A of the survey, which deals with building owners and their representatives in NSW and Victoria.

6.2.6 Part A Survey Results – Building Owners and Strata Managers

A total of 340 multiple requests were sent to strata management companies in NSW and Victoria (Table 6-6; refer to Appendix F.4 for copies of requests sent to strata management companies). Of those multiple requests, approximately 30% of responses were received in NSW and 63% of responses were received in Victoria. Out of a total delivered of actual single responses, approximately 44% were received in both NSW and Victoria.

Table 6-6: Total Requests to Strata Managers

Strata Managers	No.	Total Requests	*Responses Received	Total % Received
NSW	97	191	29	30%
Victoria	68	149	43	63%
Total Delivered	**165**	**340**	**72**	**44%**

*Note: Denotes total, unscreened responses. Refer below for total screened responses.

As previously established, the data collected from councils in NSW and Victoria that participated in this study estimated that the total number of individual apartment buildings at 36,726. The total number of unscreened individual apartment buildings owned or managed on behalf of owners who responded to this questionnaire was 2686 apartment buildings.

6.2.7 Demographic Characteristics – Building Owners and their Representatives

As with the survey to NSW and Victorian councils, embedded in the survey for building owners and their representatives is Part A and Part B. Part A deals with demographic data, and importantly, how many buildings were subject to the policy as well as the age of the building. Knowing the approximate age of the building allowed the researcher to understand the different policy requirements in each state to maintain the buildings under management (refer to Appendix A for state and territory fire safety maintenance regulatory policies). Table 6-7 shows the profile of respondents, where all responses are displayed in percentages and raw numbers.

Table 6-7: Demographic Details of Building Owners and Representatives

Characteristic		Frequency **(n = 56)
Gender	Male	64%
	Female	36%
Age	18 to24 years	2%
	25 to 34 years	20%
	35 to 44 years	27%
	45 to 54 years	23%
	55 to 64 years	14%
	65+	9%
Representative	Building owner	32%
	Owners' corporation / Strata manager	57%
	Representative of building owner	4%
	Other	7%
Education	Secondary school	13%
	VET sector diploma	13%
	VET sector advanced diploma	4%
	Associate degree	4%
	Undergraduate degree	29%
	Postgraduate diploma	23%
	Master's degree	16%
	Doctoral degree	0%
	Other	0%
Number of Buildings	Total buildings subject to the policy	1457
	Building owner	2%
	Strata manager	77%
	Facility managers	6%
	Other	16%
		No.
***Age of Buildings**	0–5 years	6
	6–10 years	13
	11–15 years	7
	16–20 years	12
	21–25 years	5
	26–30 years	3
	30+ years	8

*Note: If the respondent owned or managed more than one building, they were asked to choose a building that is the largest or has the most residential apartments. **Refers to total screened responses (see section 6.4). Note that a further two responses were removed as they contained high correlation to the variables and were deemed outside of the parameters for this study. The responses were reduced to 54 after this analysis was undertaken.

The above table demonstrates that the majority of respondents were strata managers and that those strata managers oversee at least 1457 individual multi-storey residential apartment buildings. Of the 56 usable responses obtained, 36 participants identified as male (64%) and 20 identified as female (36%). Regarding education, 15% of respondents had a VET sector diploma, 26% had an undergraduate degree, 16% had a postgraduate diploma and 16% had a master's degree.

6.2.8 Response Rate

The total response rate by firstly councils was 82 (unscreened) for both NSW and Victoria, with a total of 116 contacted, or 71%. However, after screening this was reduced to 52, a final response rate of 45%. According to Baruch and Holtom (2008), survey response rates average 35.7%. Therefore, the response rate from council organisations exceeded the average response rate from identified research.

When you compare this to the responses from strata managers and building owners, the total responses were 72 (unscreened) from a total deliverable of 165, or 44%. With a total of 72 responses (29 from NSW and 43 from Victoria), the response rate for NSW was 30% and Victoria 63%, therefore exceeding an average online survey response rate of 44.1% (Meng-Jia et al., 2022). However, when data screening was included, this result was reduced to 56 responses, a final response rate of 33%. This response rate is slightly lower than the average of 35.7% (Baruch & Holtom, 2008). Therefore, the response rate in this study from the questionnaire distribution is similar to other average identified response rates.

After a careful review of the survey responses from council and property owners including their representatives, and the theoretical framework by Ajzen's TPB to determine the building owners' intention and behaviour, it was decided exclude Part B of the survey with respect to the regulator's response. The use of the TPB to determine the intentions and behaviours of building owners and their representatives to ultimately change their behaviour and undertake fire and life safety maintenance on their building is considered compatible with this theory (Ajzen, 2020; Tornikoski & Maalaoui, 2019). Utilising the responses under Part B of the survey completed by the regulator was considered not compatible in this instance. It was further determined that the responses from the regulator in Part B of the survey would not have any material impact on the research findings involving building owners and their representatives, and this was subsequently omitted. Part A of the survey, however, the regulator is seen as vital to determine the overall compliance and translation of the policy by building owners.

It is noted that although the number of actual responses was relatively low, every conceivable attempt was made to elicit replies. This included contacting each participant with telephone calls to discuss the survey and then immediately following up with e-mail requests at four separate times. It was

envisaged that phone calls and follow up e-mail requests to complete the survey, as recommended by Veal (2005), would provide a greater rate of response, however this did not eventuate. Further requests were then made to strata and building owner association groups, as well as online forums to elicit responses (see Table 5-9 for a detailed list of all industry contacts).

Having discussed the survey response rate from local government authorities and building owners including their representatives, the next stage will further discuss the screening of responses and then move on to the data analysis stage.

6.3 Screening of Responses

6.3.1 Building Owners and Their Representatives

The total number of responses from Victorian and NSW building owners and their representatives was 72. Of the total responses, 16 were discarded due to incompleteness or failure to finalise the respective responses, which did not permit conclusions to be drawn. This left a total of 56 workable responses, or 34% out of a distribution of 165.

According to Veal (2005), a sample size of 55 will provide a confidence level of 90%. Therefore, as the number of responses will provide a confidence level of 90%, it was decided to continue with the screening of the survey replies and then move on to data analysis.

6.3.2 Survey Responses

Although the number of responses was relatively low (Table 5-9 shows the extensive lists of organisations and details of contacts made), a confidence level of 90% was established. Given the high confidence level obtained, it was concluded that the consultation completed was sufficient to analyse.

The reach of this survey and requests that went to every possible organisation and stakeholder with interests and ownership of multi-storey residential apartment buildings in Victoria and NSW was considered a saturation point of organisations that either own or manage multi-storey residential apartment buildings (see Appendix F for copies of e-mails and details of organisations and individuals contacted). Of the usable 56 responses, 18 were from building owners, two were a representative of a building owner, 32 were from strata managers and four identified as other. Although only 56 responses were received, a total of 1457 individual buildings were identified as part of the survey. Of those buildings identified, 22 respondents were building owners, 85 were facility managers, 1117 were strata managers on behalf of building owners and owners' corporations, and 233 identified as other. Table 6-8 details the responses from each state and the number of buildings subject to the policy.

Table 6-8: Number of Buildings Subject to the Policy

State	Responses	Individual Buildings Subject to Policy
Victoria	33	901
NSW	23	556
Total	***56**	**1457**

*Note: a further two responses were removed as they contained high correlation to the variables and were deemed outside of the parameters for this study. The responses were reduced to 54 after this analysis was undertaken.

6.3.3 Non-Response Bias Test

The next part of the screening was to determine the non-response bias test. This test reviewed bias based on first or initial respondents to the questionnaire versus the late respondents that were considered as non-respondents. Although the response rate was relatively high for building owners, exceeding the standards of 30% for surveys (Armstrong & Overton, 1977), the relatively low total response total of 72 will be used in this test. The use of the Levene's test for equality of variance was deemed suitable to show the values (Coakes & Steed, 2009; Gaur & Gaur, 2006), including undertaking a t-test. The t-test does not require a large sample size, with as little as 30–40 individual responses required (Gaur & Gaur, 2006, p. 52); therefore, using SPSS detailed the homogeneity of variance. Levene's test for equality of variance also determines the F statistic value, showing the significance of the variance. The value of $p > .05$ is considered not substantially different and therefore equal variance can be accepted. However, if the F statistic is significant with $p < .05$, the two variances differ significantly, the null hypothesis being that the first and subsequent responses are equal and with a significance of .05 is unable to be rejected (Sreejesh et al., 2014). To determine the non-response bias rate, using SPSS to run the test, the responses were divided into two categories. The first wave of responses was given a variation code of 1 and subsequent waves of responses were given a variation code of 2. A total of four variables were tested: age, position in the company, location (which state they reside in) and level of education.

The results show significance when using the Levene's test, being $p = 0.003$; however, the F value was $p = 9.819$ and the two-sided p value was 0.315, showing no significance – this can be accepted. According to Af Wåhlberg and Poom (2015), not all responses need to be consistent and therefore a small number of differences will not have a great or detrimental influence on the results. The remaining results concluded that the first and second wave of responses are not substantially different, meaning that they are consistent with each other and can be used for this study. Refer to Appendix I for the t-test and Levene's test.

6.3.4 Common Method Variance Bias

The next test to be undertaken was the common method bias test. This test refers to the connection among variables that are impacted by the methodology employed for data collection; for example, the collection method, ambiguous wording, format of questions or scale type (Hair, Risher, et al., 2019).

Common method variance has been categorised into four areas: common rater effects, item characteristic effects, item context effects and measurement context effects (Podsakoff et al., 2003); they each provide a different influence on how each responder completes the question (Malhotra et al., 2006). Using self-reporting questionnaires to gather simultaneous data from identical participants can raise concerns about common method variance. These concerns intensify, particularly when both the dependent and primary explanatory variables represent perceptual measures sourced from the same respondent (Malhotra et al., 2006). The presence of common method variance becomes notable when utilising online self-report surveys. Consequently, researchers must be mindful of this bias and implement control measures to mitigate its impact. However, there is considerable debate and disagreement among researchers as to the efficacy of common method variance as a statistical technique regarding the potential for measurement data (Malhotra et al., 2006; Richardson et al., 2009). Podsakoff et al. describe the common method bias test as "*variance that is attributable to the measurement method rather than to the constructs the measures represent*" (2003, p. 879), which is a problem that needs to be addressed. Systematic variance, if not considered in the results, can lead to potentially misleading conclusions (Podsakoff et al., 2003) that require further examination to ensure that there is no systematic error that would exacerbate the respondents to satisfy social norms with positive answers (Saiyidi, 2016).

The test chosen to undertake the common method variance test to address any presence of bias was Harman's single-factor test (Harman, 1976; Malhotra et al., 2006; Podsakoff et al., 2003). The results show that 24 factors emerged, with a single factor accounting for about 18%. Therefore, as the results of the single factor were below 50%, being the most variance, it can be concluded that there is no common method bias in the data.

Having discussed the survey approach, including the data collection strategy, the survey results were presented. This included screening of data responses for council and building owner responses and justification of the response rate. The screening of data included the non-response bias test, where it was concluded that the responses did not differ from each other and therefore are suitable for this study. The common method variance was tested using the Harman's single-factor test, which concluded no common method bias. The next stage of screening of the data will now be undertaken.

6.4 Screening and Analysis

Screening of the data was undertaken to ensure accuracy provided by the respondents (refer to Chapter 5 for further explanation and details). This included checking for errors, removing missing parts of the data, and identifying outliers, normalities and patterns including extremities of views of respondents (Hair, 2009). A final check of the data was then undertaken. Due to a relatively lower response rate and the resultant initial screening, it was decided to utilise PLS-SEM. PLS-SEM is suited for smaller sample sizes where predictive accuracy is required, and it provides accurate estimates for path analysis regarding direct or indirect effects (Aburumman et al., 2022; Hair & Alamer, 2022; Hair et al., 2022; Wong, 2013); therefore, this approach is most suited. PLS-SEM has been widely used in research for behavioural sciences, marketing, management information and business strategy (Wong, 2013) and can also include a moderator as a variable (Ramayah et al., 2018). As the theoretical model is Ajzen's TPB with a moderating variable (enforcement of the policy), PLS-SEM is further supported in its use.

Although the data contained a number of missing values, common in questionnaires (de Leeuw, 2001), missing values can still be used and assessed when using SPSS software and significant missing data can produce patterns that may be overcome (Tabachnick & Fidell, 2011). However, PLS-SEM does not currently provide the predictive power of SPSS regarding missing data, and researchers need to delete whole records of questionnaire responses regardless of the efforts put into observation and data collection techniques (Wang et al., 2022). Therefore the data screening that was undertaken included stringently removing all non-responses and missing data from the survey data. Following the data review of a total of 72 responses from strata managers and owners of multi-storey residential buildings, 16 were removed as they did not contain sufficient data for analysis, in addition to the data requirments when using . A further review was then undertaken using SPSS, with revised responses of 56, to undertake the probability Mahalanobis distance (Hair, Black, et al., 2019) to determine outlier detection. Two outliers were detected and subsequently removed for clarity and consistency to be within the range of 0.001 and further in the range of 0.01 (Leys et al., 2018); therefore the remaining useful responses to be used for the remaining tests in this study is 54.

Although the data contained a number of missing values and missing data does occur and can be used and assessed when using SPSS software, significant missing data can produce patterns that may be overcome (Tabachnick & Fidell, 2011). Due to the lower than anticipated responses from the survey, PLS-SEM was selected, which required the deletion of many responses than otherwise would not have been required if using SPSS software.

6.4.1 Outliers Assessment

The next stage in cleaning the data involved determining outliers in the responses. Outliers are the results of extreme values on a single variable or two or more variables, or data errors than can affect and distort the mean and standard deviation. Outliers should be found and either explained, deleted or accommodated (Kline, 2015; Schumacker & Lomax, 2004). Determining outliers is crucial, as it can lead to significantly incorrect estimates that can provide a large disproportionate influence on the end outcome (Sullivan et al., 2021). Undertaking outlier detection is therefore paramount to ensuring that the data can produce the correct result. There are many ways to determine outliers; however, scatter plots provide an indication of whether variables are related and provide the grouping of the results showing the outliers or by utilising the Mahalanobis distance (D^2)to determine if the value is exceeded (Pallant, 2020). The Mahalanobis distance is the distance to the centroid of the remaining cases and the means of variables (Tabachnick & Fidell, 2011). This can be checked using the regression program in SPSS where outliers are determined by the chi-square value using degrees of freedom (Pallant, 2020, p. 115). According to Tabachnick and Fidell (2011), an alpha value of < 0.001 is used. The presence of outliers are confirmed if the values are > 3.3 or < -3.3. Values beyond these may be considered; however, in this case, those responses were removed from the results.

To determine the outliers, the Mahalanobis distance D^2 was determined using SPSS SEM. Calculating the Mahalanobis distance provided the degree of similarity between the scores across the variables. The significance for the Mahalanobis distance is $p = 0.001$ (Tabachnick & Fidell, 2011), gained from the χ^2 distribution with degrees of freedom equal to v, or number of variables. Therefore, values that are non-significant ($p < 0.001$) (Kline, 2015) were removed. As can be seen by Table 6-9, there are no outliers greater than $p = 0.001$.

Table 6-9: Mahalanobis Distance

Value χ^2	Outlier	Value χ^2	Outlier	Value χ^2	Outlier
53.01818	0.8346	44.2423	0.5386	37.95963	0.2729
53.01818	0.8346	43.54469	0.5090	37.92479	0.2716
53.01818	0.8346	43.4890	0.5066	36.69108	0.2252
53.01818	0.8346	43.28333	0.4978	36.50455	0.2185
50.41468	0.7653	43.23046	0.4955	36.26841	0.2102
49.70254	0.7434	42.68804	0.4721	34.94034	0.1663
47.89306	0.6822	42.51378	0.4646	34.53727	0.1540
47.75088	0.6771	42.04276	0.4442	33.45632	0.1238
47.67126	0.6742	41.63599	0.4265	32.92138	0.1103
47.56586	0.6704	41.35450	0.4144	31.94246	0.0880
47.11408	0.6536	41.34460	0.4139	30.97955	0.0692
46.74588	0.6397	41.25999	0.4103	30.42789	0.0598
46.68426	0.6373	40.80553	0.3907	29.25060	0.0427
46.0060	0.6109	40.69608	0.3860	28.58240	0.0348
45.47973	0.5898	40.27349	0.3679	27.71645	0.0262
44.95192	0.5682	40.09111	0.3602	25.95968	0.0139
44.60893	0.554	39.27235	0.3258	25.01660	0.0095
44.44377	0.5471	38.16581	0.2810	24.81515	0.0087

Following completion of determining outliers, a normality assessment was undertaken to check the skewness and kurtosis.

6.4.2 Normality Assessment – Skewness and Kurtosis

As discussed in Chapter 5, a normality assessment is required to determine any distribution deviation. This is predominantly undertaken using skewness and kurtosis to show the shape of the distribution and characteristics to ensure normality. The value of skewness should be in the range of –1 to +1, and kurtosis should fall within the range of –3 to +3 (Lewis-Beck et al., 2004) for normality. An assessment of all the constructs of the framework was undertaken, with the end results shown below.

The skewness provides the symmetry of values for the distribution, whereas kurtosis provides the peakedness of distribution. Positive skewness demonstrates scores clustered left at the low end, whereas negative skewness demonstrates scores at the high end and right-hand side of the graph. Positive kurtosis shows a higher peakedness to the centre whereas values below zero show a flat distribution, often in the extreme (Pallant, 2020). An assessment of each of the constructs was

undertaken to determine the skewness and peakedness. The results from these tests for each construct that fall outside of the range as detailed above are:

- Attitude: Att 1.1 (–1.342), Att 1.2 (–1.501) and Att 1.8 (–1.416) for skewness, however all values for kurtosis are within the range of distribution.
- Subjective norm: N 1.5 (–1.393), SN 1.7 (–1.473) and SN 1.8 (–2.249) for skewness, however these are all negative values. For kurtosis for SN 1.8 (5.790) is outside of standard normality and has positive values, indicating a peaked distribution.
- Perceived behavioural control: PBC 1.5 (–1.694), 1.6 (–2.129) and 1.7 (–1.593) are outside of normal distribution for skewness, however all have a negative value range providing scores above the mean, whereas PBC 1.5 (4.286) and 1.6 (6.650) are outside of standard normality and have positive values, indicating a peaked distribution.
- Moderation enforcement: all values are within normality for skewness and kurtosis.
- Intention: INT 1.2 (–1.192) and 1.3 (–1.046) are outside of normal distribution for skewness, however all with a negative value range providing scores above the mean, whereas skewness are within standard normality and have positive values of distribution.

Refer to Appendix G for all tables for each construct.

Having established the normality assessment through skewness and kurtosis, the next step in data cleansing is to examine the correlation between the variables. This will be undertaken through the multicollinearity analysis.

6.4.3 Multicollinearity Analysis

The multicollinearity test examines the correlation between independent variables or between one variable and a linear combination of other variables (Alin, 2010). When the results of this test are above r = 0.9, variables are highly correlated (Hair, 2009; Pallant, 2020; Sreejesh et al., 2014). However, a lack of high correlation does not necessarily mean that there is a lack of collinearity, as this may be from a combined effect of other variables.

A check of the multicollinearity analysis was therefore undertaken through SPSS to ensure that all correlation coefficients were less than 0.8. The results were then taken through a series of re-tests and reduced variables, where a final result was obtained that eliminated all results above 0.8. For full results, refer to Appendix G.

A further assessment was then undertaken by calculating the variance inflation factor (VIF). VIF is the effect that other independent variables rely on the standard error of other indicators, where large values indicate a high level of multicollinearity (Hair, Black, et al., 2019). Kock and Lynn (2012) describe two ways to undertake a collinearity check. The first entails creating multiple dummies of

latent variables where the predictor criteria shows the dummy variable; the other is to perform a full collinearity test. This is the creation of the dummy variable where all latent variables point at the dummy and allow for identifying collinearity within the variables. The full collinearity test as described by Kock and Lynn (2012) was undertaken using SmartPLS4 software, with all constructs pointed to the newly created dummy variable. Using SmartPLS4, the results were obtained via the quality criteria path model (refer to Table 6-10 for results). Generally, VIF results of ≥ 3.3 suggest collinearity, whereas variables with a VIF value > 10.0 may be redundant (Hair, 2009; Kline, 2015), as this value is the minimum.

Table 6-10: VIF Values from a Collinearity Test using SmartPLS4

Construct	VIF	Construct	VIF
Att 1.10	1.300	PBC 1.4	1.271
Att 1.2	1.785	PBC 1.5	2.120
Att 1.3	2.383	PBC 1.6	2.174
Att 1.4	2.159	PBC 1.7	1.466
Att 1.5	1.328	Random	1
Att 1.6	1.925	SN 1.1	1.401
Att 1.7	2.094	SN 1.2	1.748
Att 1.8	1.828	SN 1.3	1.303
Att 1.9	1.979	SN 1.4	1.950
Enf 1.2	1.663	SN 1.5	2.155
Enf 1.3	2.875	SN 1.6	2.746
Enf 1.4	2.859	SN 1.7	3.085
Enf 2.1	2.446	SN 1.8	2.624
Enf 2.2	2.493	SN 2.1	1.827
Enf 2.3	2.001	SN 2.2	1.696
Enf 2.4	1.609	SN 2.3	1.354
Int 1.1	2.808	SN 2.4	1.225
Int 1.2	3.835	SN 2.5	1.399
Int 1.3	4.670	SN 2.6	2.516
PBC 1.1	1.035	SN 2.7	2.287
PBC 1.2	1.265	SN 2.8	1.551

There are many reasons that high correlations occur, and according to Schumacker and Lomax (2004), errors could be through relative answers to questions, bias, variation in response patterns and the design of questionnaire.

As can be seen in Table 6-10, Int 1.3 shows a value of 4.67 and Int 1.2 is slightly above 3.3, both below a threshold of 5.0 as suggested by Kock and Lynn (2012), indicating a higher than expected collinearity result. These values, however, are below 10.0 (VIF < 10.0) and according to Kline (2015) can be used, as they are not highly collinear (Sreejesh et al., 2014, p. 203). The remaining values are below 3.3 (VIF < 3.3), indicating no correlation.

6.4.4 Reliability and Validity Assessment

The next stage of the study determines the reliability and validity of the measurement scale. The reliability test is one of the most used measures for items' internal consistency in the social sciences (Bonett & Wright, 2015; Tavakol & Dennick, 2011). Reliability test can be carried out using Cronbach's alpha reliability and composite reliability. Both aims to test the internal consistency of indicators sitting under a latent construct and their values range between 0 and 1 (Tavakol & Dennick, 2011). In this case (Table 6-11), the Cronbach's alpha varies from 0.591 to 0.919 which satisfies the threshold value of 0.6 and above (Nunnally (1978).

Composite reliability (rho_a, rho_b) is also a measure of internal consistency of all indicators under a latent construct. Its value ranges between 0 and 1 and, if greater than 0.7, it indicates that the internal consistency exists. All constructs appear to be reliable because the composite reliability varies between 0.765 and 0.949 which is greater than the threshold value 0.7 (Hair, Black, et al., 2019). Refer Table 6-11 for Composite reliability.

Table 6-11: Reliability and Validity Results

	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Attitude	0.852	0.885	0.882	0.518
Behaviour	0.919	0.921	0.949	0.860
Enforcement_1	0.871	0.882	0.911	0.718
PBC	0.737	0.813	0.818	0.552
Sub_Norm 1	0.840	0.922	0.826	0.504
Sub_Norm 2	0.591	0.765	0.769	0.556

6.4.5 Convergent Validity

Following on from the reliability and validity testing of the results, the next stage undertaken was convergent validity. Convergent validity deals with two constructs that are similar to each other (Hair, Black, et al., 2019). To assess the convergent validity, the criterion developed by Fornell and Larcker

(1981) was utilised, as this deals with other variables and constructs that are closely related. In order for there to be acceptable variance between variables, the average value of 0.5 should be achieved (Fornell & Larcker, 1981; Hair, Black, et al., 2019), where the constructs have a value of at least 50% variance to other constructs.

To ascertain convergent validity, being when two or more items within the same constructs are measured within the same concept on each measure (Krabbe, 2017; Sreejesh et al., 2014), the average variance extracted (AVE) was used (Hair et al., 2021). This determined the average variance, being the mean value of the squared loadings provided within the indicators. As the Fornell–Larcker criteria was assessed for the AVE shown in Table 6-11, the values were above 0.5 or 50% variance, and all constructs were within 0.504 to 0.860, demonstrating that convergence validity is not present and therefore has been achieved.

6.4.6 Discriminant Validity

The final step to determine the validity of the assessment model used in this study is the discriminant validity test (Hair et al., 2021). Discriminant validity test essentially assesses the items of constructs that should not be highly correlated to each other (Hubley, 2014); this was initially developed by Cronbach and Meehl 1955 (Strauss, 2005). Discriminant validity testing ensures that the items are different to the others, in that they are not related to each other or provide a low correlation among the constructs (Sreejesh et al., 2014, p. 118).

In order to achieve the discriminant validity, all items should be highly correlated with the construct or sufficiently different from others, with all items being greater than the corresponding values for each factor (Hair, Black, et al., 2019).

In order to test the discriminant validity, a full measurement model using PLS-SEM was carried out. All the item loadings under the respective construct are shown in Figure 6.3. These item loadings are listed in a Table 6-12 for ease of reference.

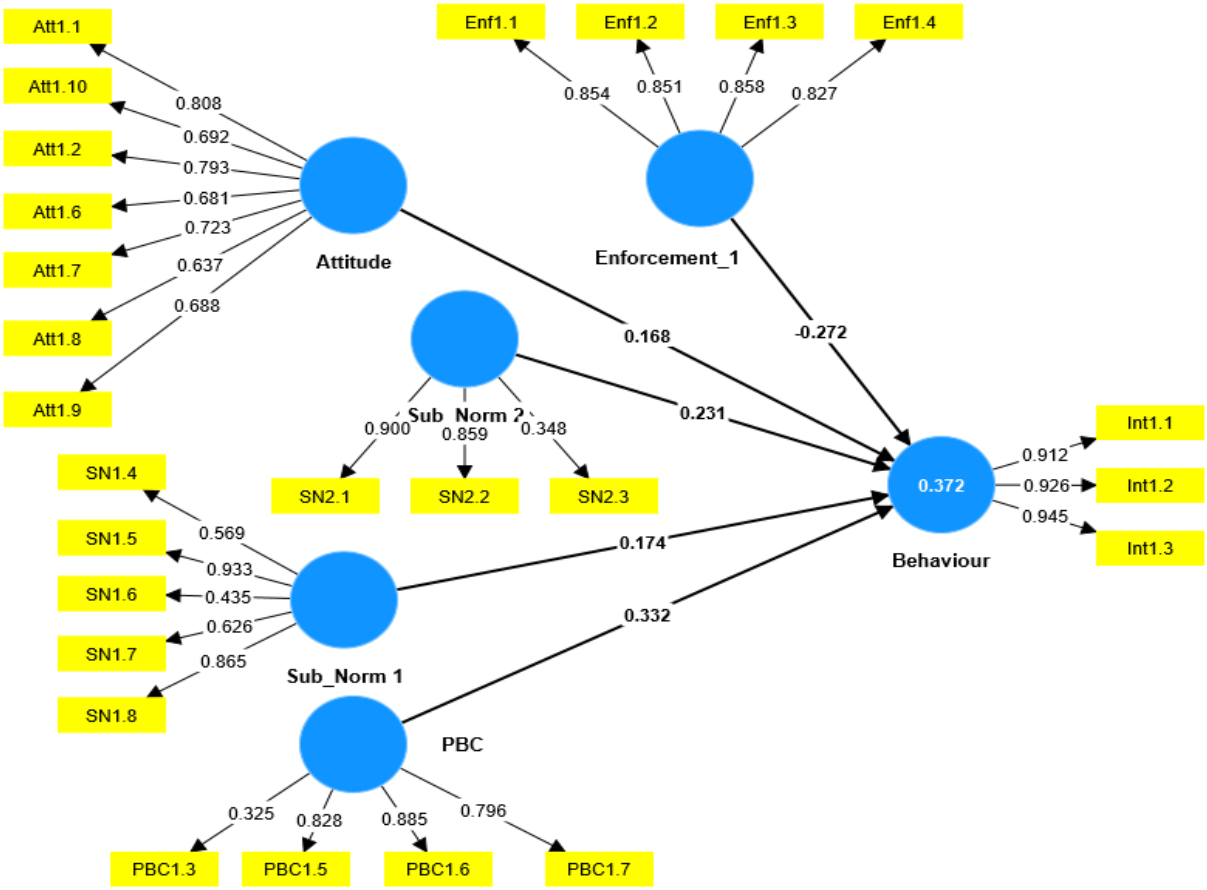


Figure 6-3: Full Measurement Model

As can be seen in Table 6-12, all cross loadings are distinctly loaded under its construct and different to each other, thereby indicating that there are no close or similar scales. This, in addition to the values being greater than 0.7, confirms that discriminant validity is achieved.

Table 6-12: Factor Cross Loadings

Item code	Attitude	Behaviour	Enforce-ment_1	PBC	Sub_Norm 1	Sub_Norm 2
Att 1.1	0.808					
Att 1.10	0.692					
Att 1.2	0.793					
Att 1.6	0.681					
Att 1.7	0.723					
Att 1.8	0.637					
Att 1.9	0.688					
Enf 1.1			0.854			
Enf 1.2			0.851			

Item code	Attitude	Behaviour	Enforce-ment_1	PBC	Sub_Norm 1	Sub_Norm 2
Enf 1.3			0.858			
Enf 1.4			0.827			
Int 1.1		0.912				
Int 1.2		0.926				
Int 1.3		0.945				
PBC 1.3				0.325		
PBC 1.5				0.828		
PBC 1.6				0.885		
PBC 1.7				0.796		
SN1.4					0.569	
SN1.5					0.933	
SN1.6					0.435	
SN1.7					0.626	
SN1.8					0.865	
SN2.1						0.900
SN2.2						0.859
SN2.3						0.348

Table 6-15 details of the measurement items, item codes and their associated construct that explain the item codes and constructs used above.

Table 6-15: Questions and Associated Numbers

Constructs	Question	
1. Attitude and Intention	**Measurement Items**	**Item code**
H1: A positive attitude toward maintaining fire and life safety provisions (through the policy) is positively related to behavioural intention to do so.	About the policy for maintaining essential fire safety systems:	
	The policy is a good idea	Att 1.1
	It is worthwhile	Att 1.2
	It is too complex	Att 1.3
	It is too time-consuming	Att 1.4
	It is satisfactory	Att 1.5
	It works well	Att 1.6
	I value the policy	Att 1.7
	The policy is essential for a building to remain safe for occupants	Att 1.8
	The policy generates confidence, which is vital for industry	Att 1.9
2. Subjective Norms and Intention		

H2: Subjective norms (support from important referents being, family, friends and peers) is positively related to the behavioural intention to do so (to undertake the act).	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building?	
	Members of your family	SN 1.4
	Co-workers	SN 1.5
	Friends	SN 1.6
	Peers	SN 1.7
	Building occupants	SN 1.8
H2.1: That support from the regulator is positively related to the behavioural intention of the act (to undertake the act, being to maintain fire and life safety systems in multi-storey residential apartment buildings).	Regarding the policy, do you believe that:	
	– you receive sufficient support from stakeholders including government departments, regulators and agencies?	SN 2.1
	– you have been made aware of the requirement to maintain your building's fire safety systems by the regulatory authority?	SN 2.2
	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? – Regulators and government agencies	SN 2.3
3. Perceived Behavioural Control and Intention		
H3: That perceived behavioural control is positively related to behavioural intention to do so (to undertake the act, being to maintain fire and life safety systems in multi-storey residential apartment buildings).	I expect that the regulator will provide support to owners to comply with the policy	PBC 1.3
	I will be encouraged to complete all of the essential fire safety maintenance provisions if I:	
	– receive support from the regulator	PBC 1.5
	– receive reminder notifications from the regulator	PBC 1.6
	– am provided with specialised training	PBC 1.7
4. Intention and Behaviour		
H4: A positive intention and ability to comply with the act is positively related to the behaviour to do so.	I am confident that I can:	
	– take responsibility to manage all of the fire safety maintenance provisions on my building.	Int 1.1
	– carry out all of the essential fire safety maintenance on my building over the next 12 months	Int 1.2
	– comply with the policy	Int 1.3
5. Enforcement of the Policy by the Regulator as the Moderator between Intention and Behaviour		
H5: The association between intention and behaviour will be moderated by enforcement of the policy by the regulator such that the association will be significantly stronger when a high level of enforcement is present.	I will comply with the policy if:	
	– I get fined by the regulator	Enf 1.1
	– I am punished in a court of law	Enf 1.2
	– my peers are not complying with the policy	Enf 1.3
	It is too difficult to complete all the fire safety maintenance provisions	Enf 1.4

It is now common in research to consider that the Fornell–Larker criterion is essentially the primary method to determine discriminant validity; however, this method occasionally fails to determine reliability discriminant issues (Henseler et al., 2015, p. 116). Recent developments indicate that the heterotrait-monotrait (HTMT) ratio criterion should be used over previous methods (Hair et al., 2021;

Henseler et al., 2015). However, both methods are used in this study to determine the assessment of discriminant validity.

Following the cross loadings assessment to determine discriminant validity, the next step used was the Fornell–Larcker criterion. This measure of discriminant validity compares the variance within and between the constructs and it should be larger than the variance between constructs (Hair, Black, et al., 2019). Therefore, the AVE of the constructs should exceed the shared variance with other constructs and shows the square root value of the average variance (Fornell & Larcker, 1981; Hair, 2009). Table 6-13 demonstrates the results of the Fornell–Larcker criteria and shows that all values that were averaged are greater when compared with the horizontal and vertical values, and therefore that discriminant validity is achieved.

Table 6-13: Discriminant Validity – Fornell and Larcker

	Attitude	**Behaviour**	**Enforce-ment_1**	**PBC**	**Sub_Norm 1**	**Sub_Norm 2**
Attitude	*0.72**					
Behaviour	0.331	*0.928*				
Enforcement_1	–0.391	–0.404	*0.848*			
PBC	–0.067	0.31	–0.007	*0.743*		
Sub_Norm 1	0.245	0.265	–0.143	0.088	*0.71*	
Sub_Norm 2	0.157	0.25	–0.172	–0.119	–0.081	*0.746*

Note: Values are significant at 5% (0.05).
*Diagonal values are the square root of AVE and should be greater than the corresponding correlation coefficients values vertically as well as horizontally.

The next test to be undertaken was the heterotrait-monotrait ratio (HTMT) criterion test using PLS-SEM software. The HTMT assessment will ensure confidence intervals significantly from the specific threshold and will be the preferred method of assessment (Hair et al., 2021). It determines the mean value of the correlations across the other results and is measured with a maximum threshold of 0.90 (Hair, Black, et al., 2019, p. 776; Henseler et al., 2015); that is, the lower value suggests that the constructs are more distinct from each other. As Table 6-14 shows, values of 0.189 to 0.44 indicate that there are no problems with the discriminant validity, and each value meets the conservative threshold.

Table 6-14: Discriminant Validity – HTMT

	Attitude	**Behaviour**	**Enforcement_1**	**PBC**	**Sub_Norm 1**	**Sub_Norm 2**
Attitude						
Behaviour	*0.328*					
Enforcement_1	0.431	*0.44*				

PBC	0.257	0.329	*0.24*		
Sub_Norm 1	0.276	0.189	0.185	*0.221*	
Sub_Norm 2	0.381	0.305	0.284	0.349	*0.366*

Note: The mean value of the correlations across the other results and is measured with a maximum threshold of 0.90.

6.4.7 Quality of Reliability and Validity of the Model

The above tests have demonstrated that the quality of the model chosen is sufficient. Table 6-13 using the Fornell–Larcker criterion demonstrates that discriminant validity is not present, while Table 6-14 showing HTMT tests shows values that indicate no issues with discriminant validity, and each value meets the threshold. Figure 6-3 demonstrates the measurement model showing all constructs and their item loadings

Further tests to determine reliability and validity included an outlier assessment using Mahalanobis distance and confirmed that there were no outliers present in the results (refer Table 6-9 Mahalanobis distance). The normality assessment was then undertaken to determine skewness and kurtosis (refer to Appendix G: Normality) for each construct and demonstrated that all values were within standard normality.

The next stage of the data analysis involved the multicollinearity test to examine the correlation between variables, and this test indicated that there was no correlation of the variables. The reliability consistency of the responses using Cronbach's alpha reliability test concluded all values were within the range and below an AVE of 0.95, as suggested by (Hair, Black, et al., 2019). Convergent validity was tested using Fornell and Larcker criterion and demonstrated that all constructs were within 0.504 to 0.860. The discriminant validity test was then undertaken to assess the model being used. This test demonstrated that the construct variable was different to others in that they were not related to each other.

The numerous reliability and validity tests undertaken further demonstrates that the quality of the model chosen is valid. Having discussed the reliability and validity of the model, the next section will detail the results of the structural model.

6.5 Evaluation of the Theory of Planned Behaviour – The Model

According to Hair et al. (2011, p. 147), the primary evaluation criteria for the structural model is the R^2 measure. This criterion explores the endogenous latent variable variance. Endogenous variables are usually placed on the left side of the diagram and have no paths towards them; rather, the paths come from within the variable. An exogenous variable is defined as latent constructs that have paths

pointing towards them (Kline, 2015). The following steps were undertaken to determine the structural model, as described by Hair et al. (2021):

Step 1: Assess collinearity issues

Step 2: Assess significance of relationships

Step 3: Assess the level of R^2

Step 4: Assess the effect sizes f^2

Step 5: Assess the predictive relevance Q^2

Figure 6-4 is a path model showing the exogenous (antecedents) and endogenous (outcome) variables. The researcher preferred to put this path model prior to undertaking analysis in subsequent stages. While this model organises the exogenous and endogenous variables in order, it offers a macro view of the whole model with the constructs and their items prior to testing their relationships by running the model using Smart-PLS 4.0

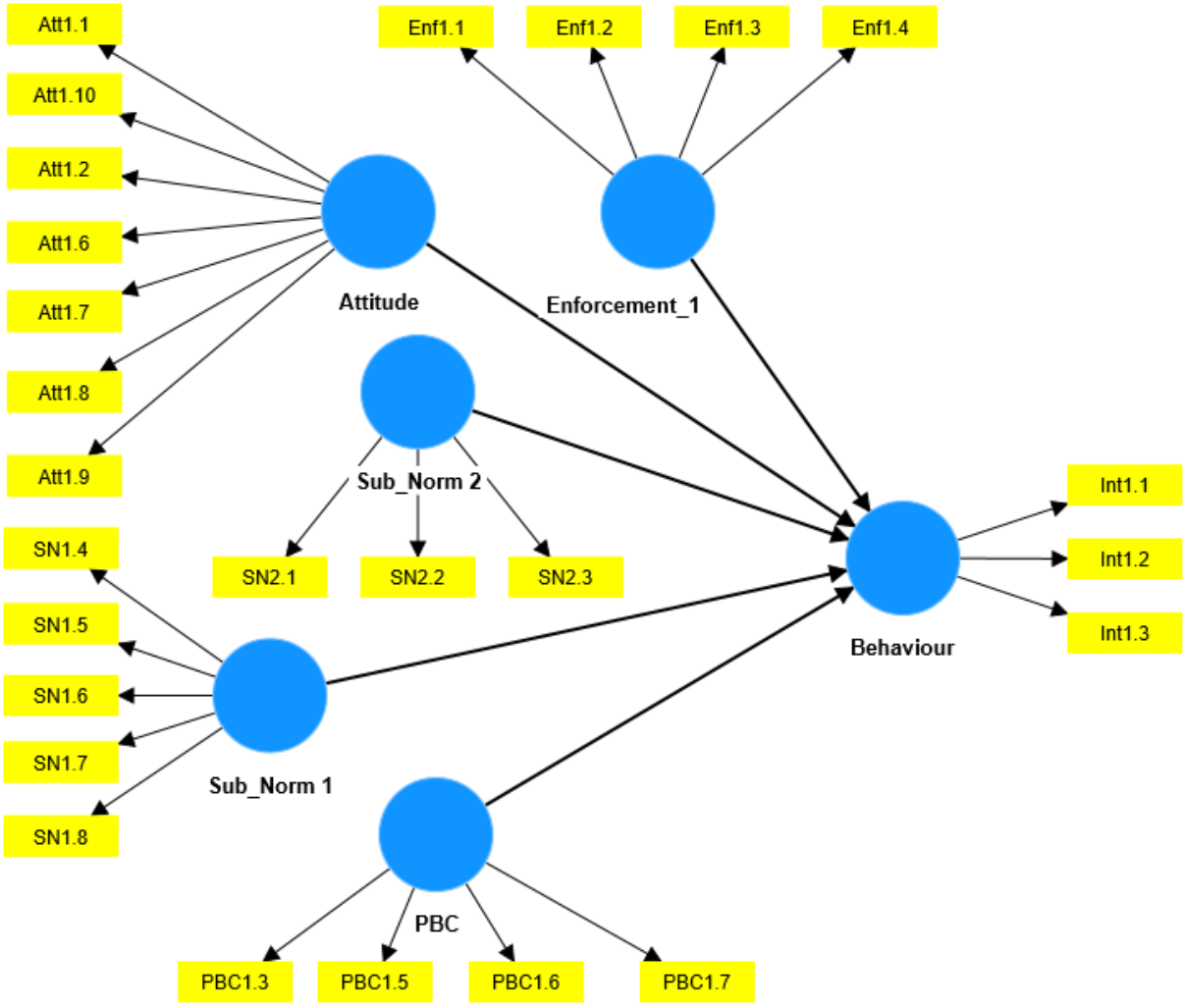


Figure 6-4: Path Model Constructs

6.5.1 Collinearity

The first step for the path model is to check the collinearity of the variables. The measurement model with latent variables such as Attitude, PBC, Sub_Norm 1, Sub_Norm 2 and Enforcement_1 and Behaviour as the predictor has been previously assessed in Section 6.4.6 using the Figure 6.3. The VIF values range from 1.262 to 1.071 (Table 6-16) which is well below a threshold value of 3.3, thus demonstrating that there is no sign of collinearity (Hair, 2009; Kline, 2015).

Table 6-16: VIF Values

	VIF
Attitude ➔ Behaviour	1.262
Enforcement_1 ➔ Behaviour	1.206
PBC ➔ Behaviour	1.028
Sub_Norm 1 ➔ Behaviour	1.096
Sub_Norm 2 ➔ Behaviour	1.071

6.5.2 Path Analysis and Hypotheses Testing

The structural model was analysed to determine the path coefficients of all paths leading from antecedent (exogenous) variables such as Attitude, Sub_norm-1, Sub_norm-2, PBC to outcome (endogenous) variable such as behaviour. Smart-PLS 4.0 was used for this test. It is important to see the significance of these coefficients using t-values and their respective p-values of each path.

Figures 6-5 shows path coefficients with *t* values and their respective *p* values within bracket.

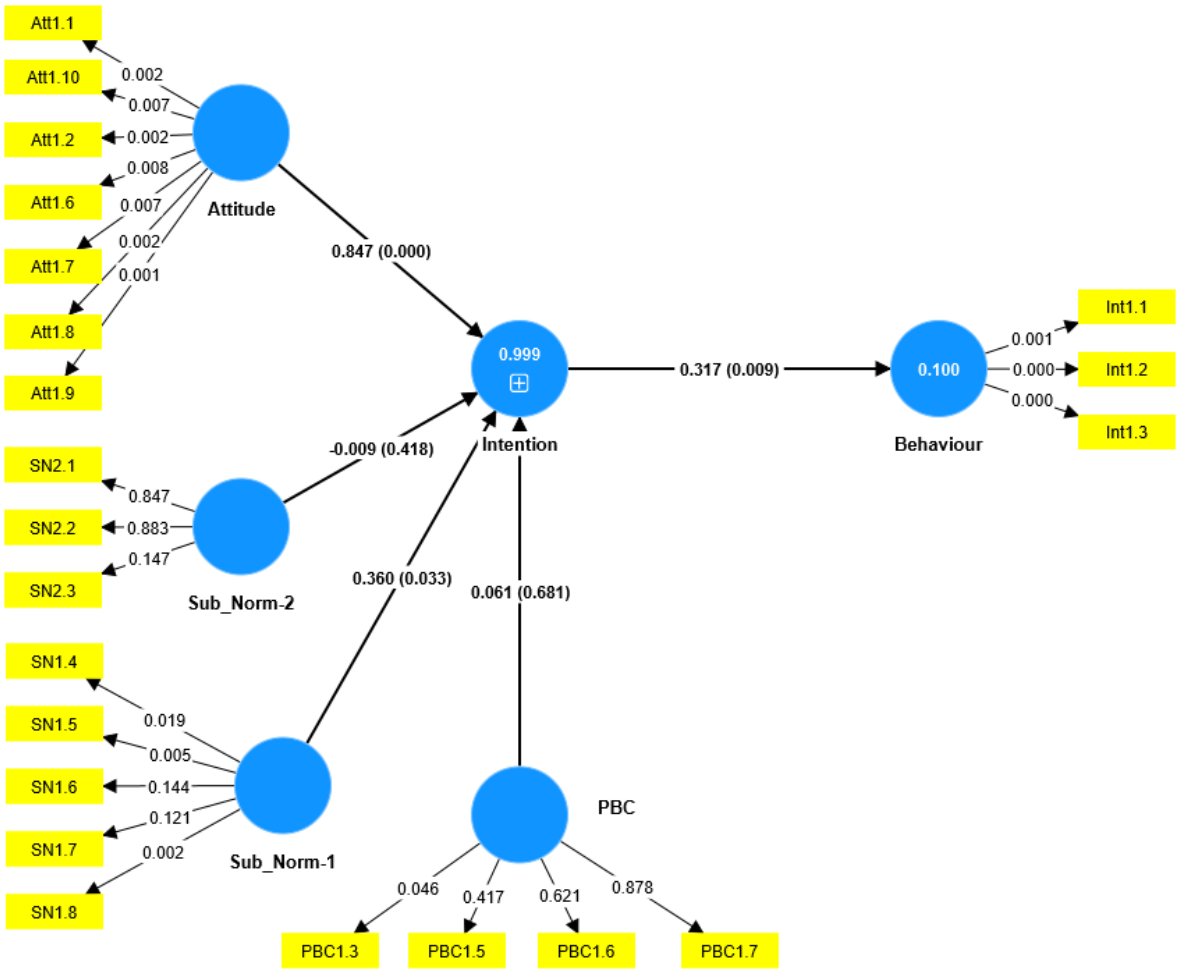


Figure 6-5: Path Model

Table 6-17 shows the results of the bootstrapping test and path coefficients of the path model.

Table 6-17: Values of Bootstrapping of Path Model

	Original Sample (O)	Sample Mean (M)	SD	T statistic (|O/SD|)	*p* value
Attitude ➔ Intention	0.847	0.734	0.166	5.107	0
Intention ➔ Behaviour	0.317	0.362	0.121	2.61	0.009
PBC ➔ Intention	0.061	0.168	0.148	0.411	0.681
Sub_Norm 1 ➔ Intention	0.36	0.363	0.168	2.139	0.033
Sub_Norm 2 ➔ Intention	–0.009	0.002	0.011	0.81	0.418

Figure 6-6 shows the results of the bootstrapping test and path coefficients with enforcement as a moderator. The results for the relationships for the path model with enforcement as a moderator show only two hypotheses H1 and H2 with coefficients of β = 0.844 and β = 0.03 and their *p* values of 0.000 and 0.003, respectively. These are supported and significant.

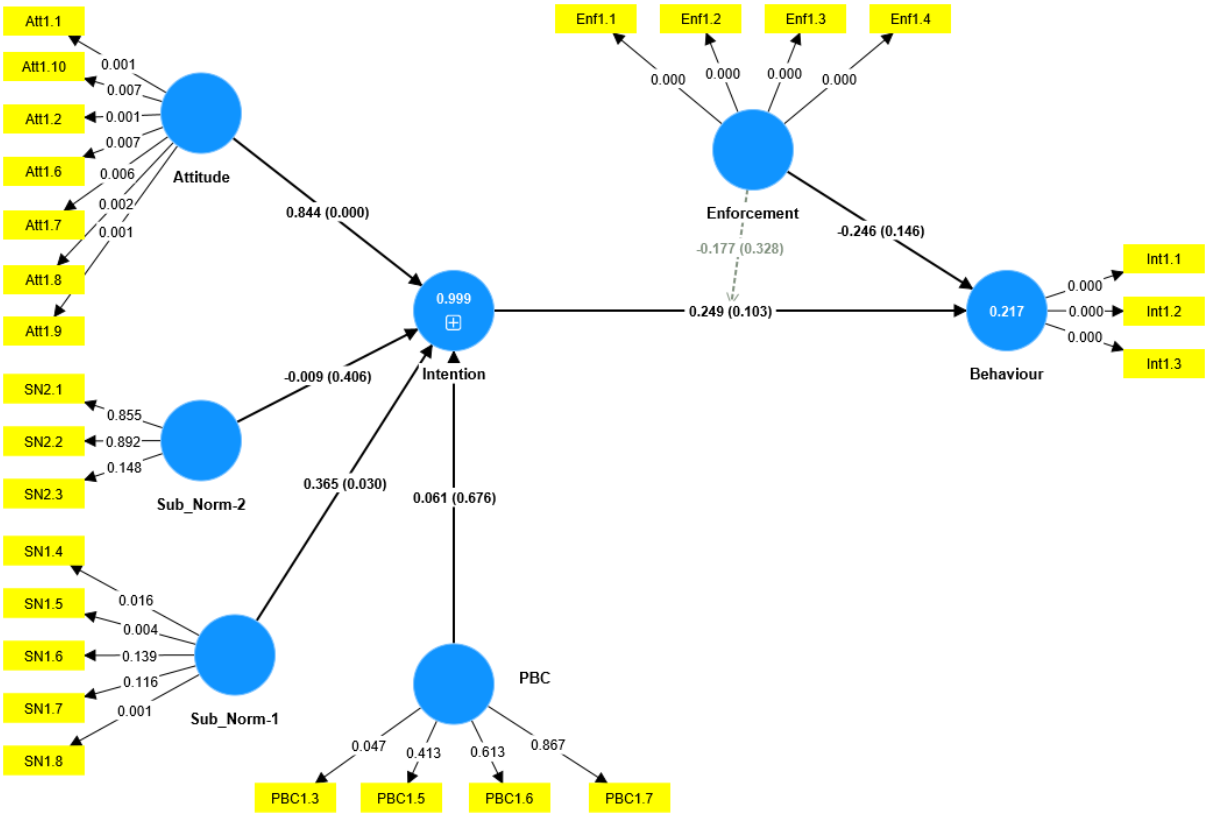


Figure 6-6: Path Model with Moderator

Table 6-18 shows the results of the bootstrapping test and path coefficients of the path model with enforcement as a moderator.

Table 6-18: Values of Bootstrapping of Path Model with Enforcement

	Original Sample (O)	Sample Mean (M)	SD	T statistic (|O/SD|)	*p* value
Attitude ➔ Intention	0.844	0.734	0.163	5.164	0
Enforcement ➔ Behaviour	–0.246	–0.305	0.169	1.455	0.146
Intention ➔ Behaviour	0.249	0.258	0.153	1.629	0.103
PBC ➔ Intention	0.061	0.168	0.147	0.418	0.676
Sub_Norm 1 ➔ Intention	0.365	0.364	0.168	2.169	0.03
Sub_Norm 2 ➔ Intention	–0.009	0.002	0.01	0.831	0.406
Enforcement × Intention ➔ Behaviour	–0.177	–0.107	0.181	0.977	0.328

Table 6-19 provides the overall results of the model to show the significance of path relationships without and with a moderator.

The results for the path analysis show a positive relationship for four of the hypotheses. These are H1, H2, H4 and H5 with coefficients of $\beta = 0.847$, $\beta = 0.36$, $\beta = 0.317$ and $\beta = 0.317$, respectively. The coefficients fall between –1 and +1, thus showing their relevance; significance levels of 0.000, 0.033, 0.009 and 0.009 are well less than $p < .05$, and the results therefore supported and significant. The path model shows a negative relationship for two of the hypotheses; these are H2.1 and H3 with coefficients of $\beta = –0.009$ and $\beta = 0.061$. These coefficients fall outside the values of –1 to +1 with *p* values of 0.418 and 0.681, respectively, and therefore they are not significant.

With reinforcement as a moderator, the hypotheses H2.1, H3, H4 and H5 show coefficients of $\beta = –0.009$, $\beta = 0.061$, $\beta = 0.249$ and $\beta = 0.246$ with *p* values of 0.406, 0.676, 0.103 and 0.106, respectively, that are not significant, as the coefficients are outside the values of –1 to +1 with *p* values greater than 5%; therefore, these are not supported.

Table 6-19: Results of Path Analysis

	Path Model ->	**Bootstrapping results for structural model**				**Bootstrapping results for structural model with enforcement as a moderator**			
H.	**Hypotheses**	**Coefficient**	**t-stat**	***p* value**	**Supported/no t-supported**	**Coefficient**	**t-stat**	***p* value**	**Supported/no t-supported**
H1	Relationship between a positive attitude toward maintaining fire and life safety provisions (through the policy) is positively related to behavioural intention to do so.	0.847	5.107	0.000	supported	0.844	5.164	0.000	supported
H2	Relationship between subjective norms (support from important referents being, family, friends and peers) is positively related to the behavioural intention to do so (to undertake the act).	0.36	2.139	0.033	supported	0.365	2.169	0.03	supported
H2.1	Relationship between support from the regulator is positively related to the behavioural intention of the act (to undertake the act).	–0.009	0.81	0.418	Not-supported	–0.009	0.831	0.406	Not-**supported**
H3	Relationship between perceived behavioural control is positively related to behavioural intention to do so (to undertake the act)	0.061	0.411	0.681	Not-supported	0.061	0.418	0.676	Not-**supported**
H4	Relationship between a positive intention and ability to comply with the act is positively related to the behaviour to do so.	0.317	2.61	0.009	supported	0.249	1.629	0.103	Not-supported
H5	Relationship between the intention and behaviour will be moderated by enforcement of the policy by the regulator such that the association					-0.177	0.977	0.328	Not-supported

	will be significantly stronger when a high level of enforcement is present.

6.5.3 Level of R^2 Explanatory Power

The third step used to determine the path model is the assessment of coefficient of determination (R^2) of the endogenous constructs. Coefficient of determination (R^2) explains the predictive power of e exogenous constructs (i.e. Attitude etc.) on endogenous construct (i.e., behaviour)(Hair et al., 2011; Shmueli & Koppius, 2011). In this study, the R^2 values used to predict the endogenous latent variables are 0.75, 0.50 or 0.25, described, as a rule of thumb, as substantial, moderate or weak for predictive power (Hair et al., 2021; Hair et al., 2011). Therefore, the variance in the endogenous latent variables of attitude, subjective norm and perceived behavioural control with enforcement as a moderator is explained by the R^2 value. As the three endogenous latent variables are placed into intention, only intention and behaviour are provided with values. The intention value is 0.999, indicating a substantial value, and behaviour is 0.100, providing a weak value for the predictive power without the moderator enforcement. In terms of the model using enforcement as the moderator, values are 0.999 for intention, indicating a substantial value, and 0.217 for behaviour, indicating a weak value for predictive accuracy, albeit a slightly higher value. This shows that in both path models there is a substantial value and weak value indicating the predictive accuracy.

6.5.4 Level of Predictive Power f^2 on Effect Size

The next step in the path model is to determine the predictive power (f^2) on the effect size, the second measure to determine the quality of the path model (Cohen, 1992, 2013), while R^2 is the measure of the explanatory power of the model (Hair et al., 2021). To calculate the f^2value, Cohen's formula was used.

$$f^2 = \frac{R^2}{1 - R^2}$$

further adapted to

$$f^2 = \frac{R^2_{\text{included}} - R^2_{\text{excluded}}}{1 - R^2_{\text{included}}}$$

In the above, R^2 included and R^2 excluded have been incorporated into Cohen's equation based on Hair et al. (2014) and represent the R^2 value. This is for the dependant variable when omitted or excluded or included from the path model. Figure 6-7 shows the path model values obtained with enforcement.

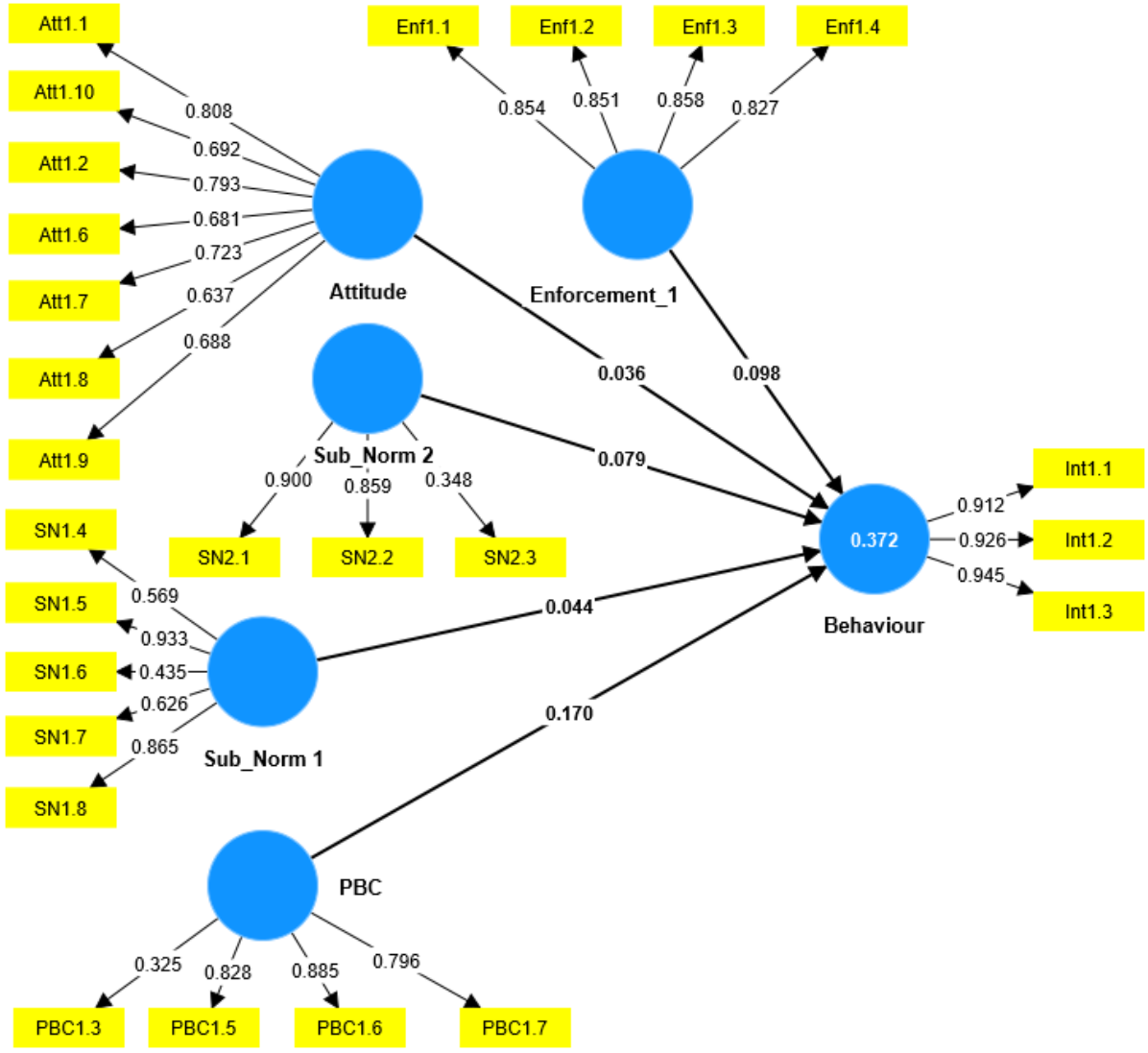


Figure 6-7: Path Model with Enforcement

The effect size f^2 values as taken from Cohen (1992) are 0.02 small, 0.15 medium and 0.35 large. The results in Table 6-20 further demonstrate the ranges that are within the values suggested by Cohen (1992).

Table 6-20: f^2 Results for Path Model with Enforcement

Model	f^2
Attitude ➔ Behaviour	0.036
Enforcement_1 ➔ Behaviour	0.098
PBC ➔ Behaviour	0.17
Sub_Norm 1 ➔ Behaviour	0.044
Sub_Norm 2 ➔Behaviour	0.079

The next stage was the path model using the moderator and what affect this would have. As can be seen from Table 6.21, the predictive power is considered weak for the path model, apart from PBC ➔ Behaviour. Figure 6-8 shows the path model values obtained without enforcement as a moderator.

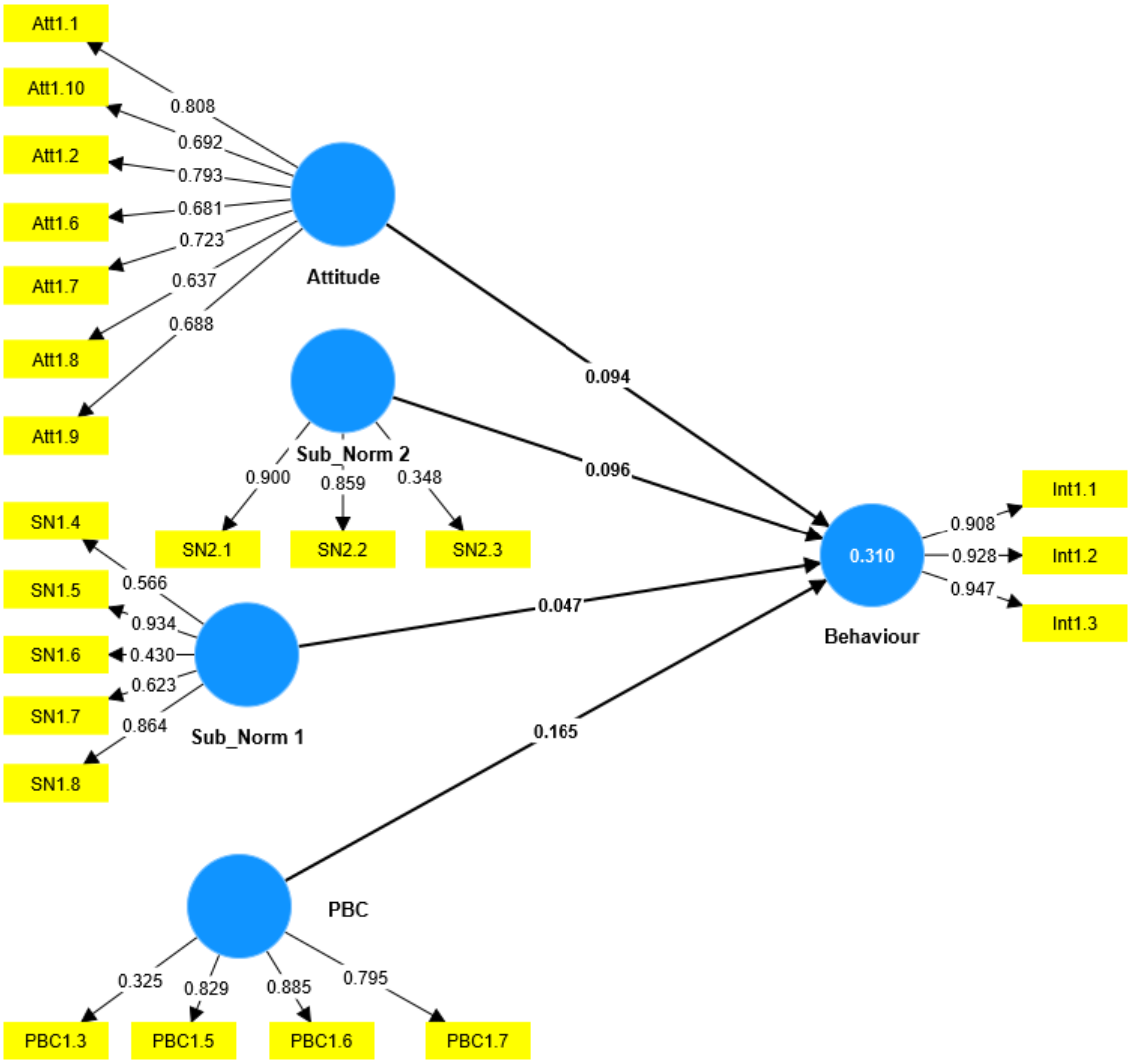


Figure 6-8: Path Model without Enforcement

Table 6-21: f^2 Results for Path Model without Enforcement as Moderator

Model	f^2
Attitude ➔ Behaviour	0.094
PBC ➔ Behaviour	0.165
Sub_Norm 1 ➔ Behaviour	0.047
Sub_Norm 2 ➔ Behaviour	0.096

To assess the predictive relevance the Q^2 test was undertaken to determine the predictive quality of the model, where a result greater than 0 ($Q^2 > 0$) (Hair et al., 2014; Shmueli et al., 2019) demonstrates that the model has predictive ability. As the model shows, the predictive power of the endogenous constructs using SmartPLS4 establishes the predictive relevance of the endogenous constructs (Gaskin, 2022). As behaviour is the endogenous construct leading into behaviour, only one value was provided that was run twice, with and without enforcement as moderator. The results for the model without enforcement as a moderator, behaviour $Q^2 = 0.003$ (endogenous construct), and with enforcement as a moderator, behaviour (1 endogenous construct) $Q^2 = 0.073$ (1 endogenous construct) were both $Q^2 > 0$, and therefore confirm the presence of predictive power.

6.5.5 Moderation Interaction Effect

The role of a moderator in this study was to explore the effect of enforcement of the policy on building owners and their representatives to change their behaviour by implementing the policy. The relevant hypothesis regarding the role of the moderating effect is:

> *H5: The association between intention and behaviour will be moderated by enforcement of the policy by the regulator such that the association will be significantly stronger when a high level of enforcement is present.*

The moderation analysis was carried out using SmartPLS 4.0. This is to determine if enforcement, as a moderator, has any effect on, or can influence the owners' behaviour. Smart (2012) postulates that compliance and penalties will positively influence the behaviour of the individual using Ajzen's TPB. Therefore, enforcement by the regulator is examined in this study.

Figure 6-9 shows the enforcement as a moderator which affects the relationship between intention and behaviour. The diagram shows a dotted line emerges from the moderator Enforcement that hits the path between independent variable Intention and dependent variable Behaviour.

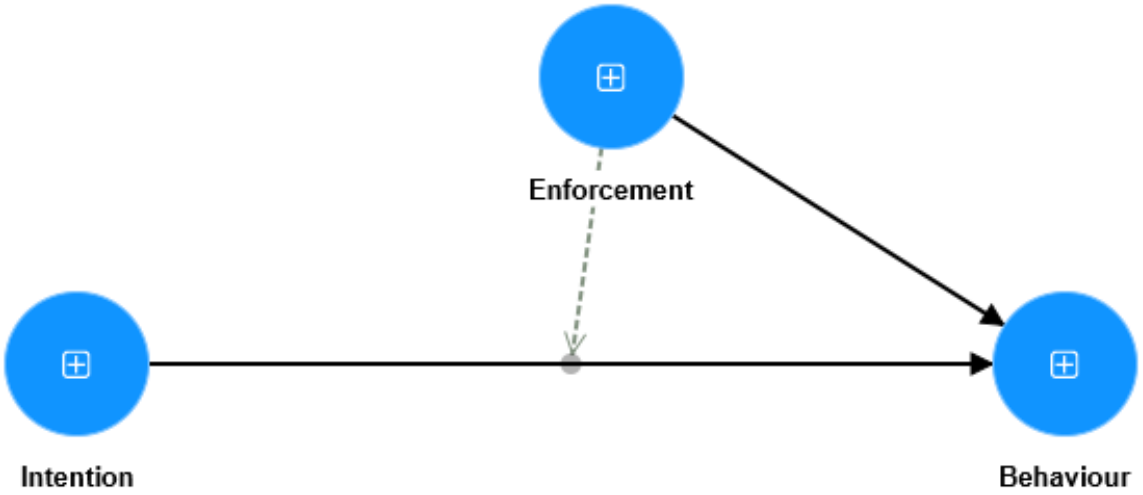


Figure 6-9: Moderator Effect

To demonstrate the effect that enforcement has on the relationship between intention and behaviour, a two-staged PLS approach was utilised to determine the moderating effect when formative constructs are involved, as recommended by Henseler and Fassott (2010, p. 724). Stage 1 included the main PLS path model to determine the latent variable scores; these are provided in section 6.7. The scores obtained as recommended by (Hair et al., 2021; Kline, 2015; Streukens & Leroi-Werelds, 2016) provided the final scores for the path model that will be used as the stage 1 moderating effect and were saved in a separate file for use in the stage 2 moderating approach as per Henseler and Fassott (2010). To undertake the stage 2 moderation approach, the saved model from the first stage was then run through SmartPLS4 regression automatically to provide the results of the stage 2 moderation.

6.5.6 Results of Moderation Effect

The path model as detailed in Figure 6-10 and Table 6-22 indicates that the result for the moderating effect range from $\beta = -0.009$ for Sub_Norm 2 ➔ Intention to $\beta = 0.844$ for Attitude ➔ Intention.

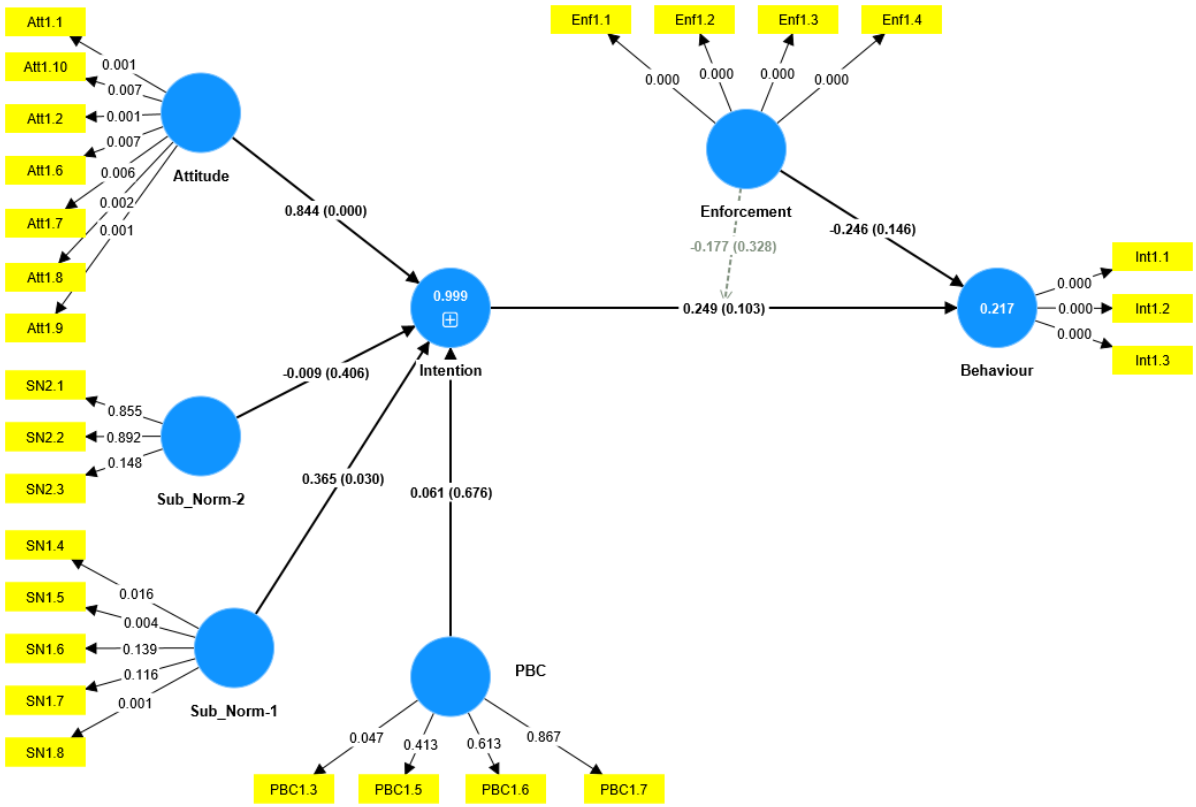


Figure 6-10: Path Coefficients with Enforcement as a Moderating Effect

Table 6-22: Path Coefficients of Model

	Path Coefficient
Attitude ➔ Intention	0.844
Enforcement ➔ Behaviour	–0.246
Intention ➔ Behaviour	0.249
PBC ➔ Intention	0.061
Sub_Norm 1 ➔ Intention	0.365
Sub_Norm 2 ➔ Intention	–0.009
Enforcement × Intention ➔ Behaviour	–0.177

As discussed in section 6.5.2, the results for the relationships for the path model with enforcement as a moderator only show a significant relationship of Attitude ➔ Intention with a coefficient of $\beta = 0.844$ and $p = 0.000$, and Sub_Norm 1 ➔ Intention with a coefficient of $\beta = 0.365$ and $p = 0.03$,respectively. Both β values are within the range of –1 to +1 and the p values are $p > .05$, which are significant and therefore supported. The remaining values show coefficients of $\beta = –0.009$,

β = 0.061, β = 0.249 and β = -0.246, respectively, with *p* values of 0.406, 0.676, 0.103 and 0.146 that are not significant, as the coefficients are outside the values of –1 to +1 and the *p* values are greater than 5% and therefore are not supported (Table 6-23).

Table 6-23: Moderation Values

	Path Coefficient(β)	**T-stat**	***p* value**	**Significant Yes / No**
Attitude ➔ Intention	0.844	5.164	0	Yes
Enforcement_1 ➔ Behaviour	–0.246	1.455	0.146	No
Intention ➔ Behaviour	0.249	1.629	0.103	No
PBC ➔ Intention	0.061	0.418	0.676	No
Sub_Norm 1 ➔ Intention	0.365	2.169	0.03	Yes
Sub_Norm 2 ➔ Intention	–0.009	0.831	0.406	No
Enforcement_1 × Intention ➔ Behaviour	–0.177	0.977	0.328	No

To further explain the interaction relationship between intention and behaviour with enforcement as a moderator, a simple slope analysis was undertaken in SmartPLS 4.0. The results show the β value is –0.177 and p value 0.328 (Table 6.23). Since β is negative, the intention has negative effect on moderation. As can be seen in the slope analysis, there are three lines spreading out with the mean reinforcement in the centre and other two lines diverging at +/- 1.5 SD (note: SD is standard deviation). It states that when the reinforcement is less than the mean value at -1.5 SD, that is at low value of reinforcement, the slope is much stronger. And when the reinforcement is higher at +1.5 SD, that is at higher value of reinforcement, the slope is weaker. This indicates that the relationship between intention and behaviour decreases at higher level of enforcement. In other words, with negative β, as the value of reinforcement increases the relationship between intention and behaviour to implement policy decreases.

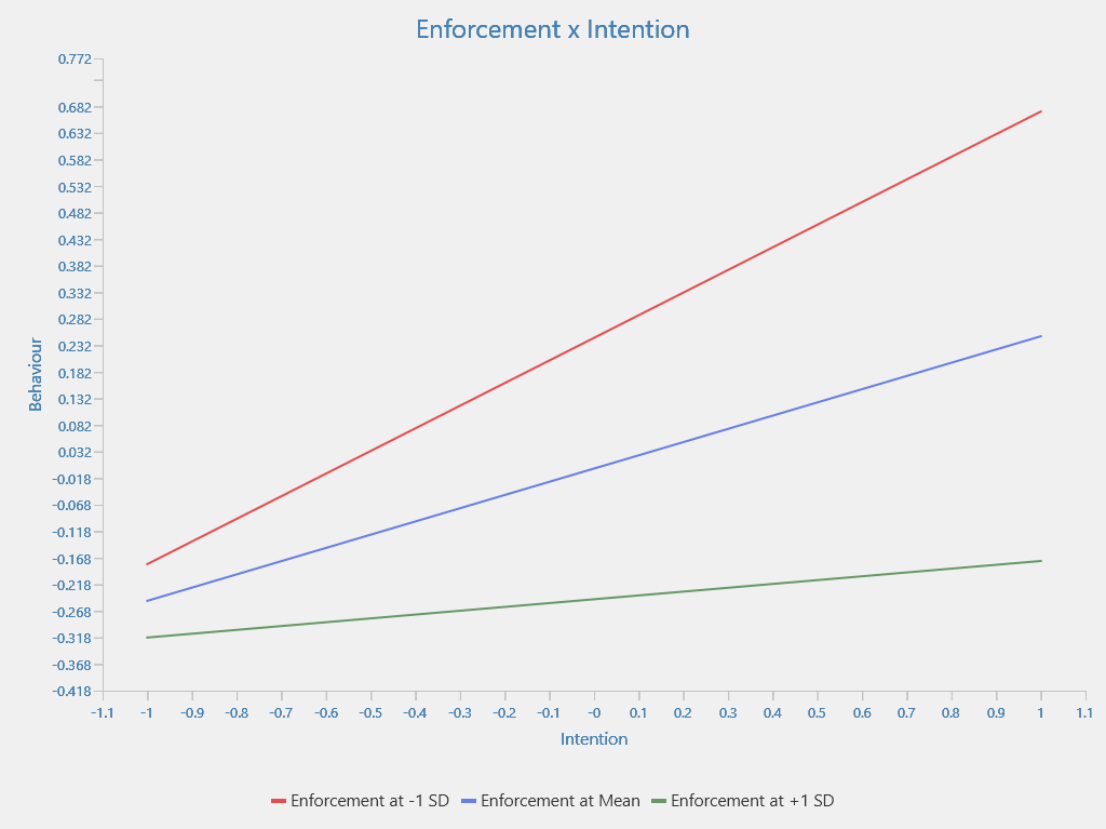


Figure 6-11: Slope Analysis of Intention and Behaviour with Enforcement as Moderator

6.5.7 Goodness of Fit

Incorporating goodness of fit (GoF) into this study served the purpose of ensuring that the theoretical framework was well suited for the overall scope and application of the research. The relevant question that relates to the hypothesis regarding the GoF criteria is:

> *H6: That the TPF is a good fit to establish compliance of the policy regarding ESM maintenance of multi-storey residential buildings.*

As discussed in Chapter 5, the GoF assessment of the model was conducted in two stages. The first adopted a global GoF model as suggested by Tenenhaus et al. (2004). The R^2 is indicated within the circles of each construct and the GoF results are shown at the bottom right of the figures. According to Henseler and Sarstedt (2013) GoF indices can be interpreted by the geometric mean of the R^2 values that are averaged, where the average communality of the variables taken from Fornell and Larcker measures multiplying them from the R^2 latent variables (Tenenhaus et al., 2005).

$$\text{GoF} = \sqrt{\overline{\text{communality}} \times \overline{R^2}}.$$

Given the nature of the model, the variance for the two constructs is provided with the R^2 value. The average of the constructs using the Fornell–Larker criterion were previously calculated using SmartPLS 4.0; the formula shown above was then used to calculate the GoF for the two models in figures 6-12 and 6-13 (with and without enforcement as a moderator) showing the path model relationships of the constructs.

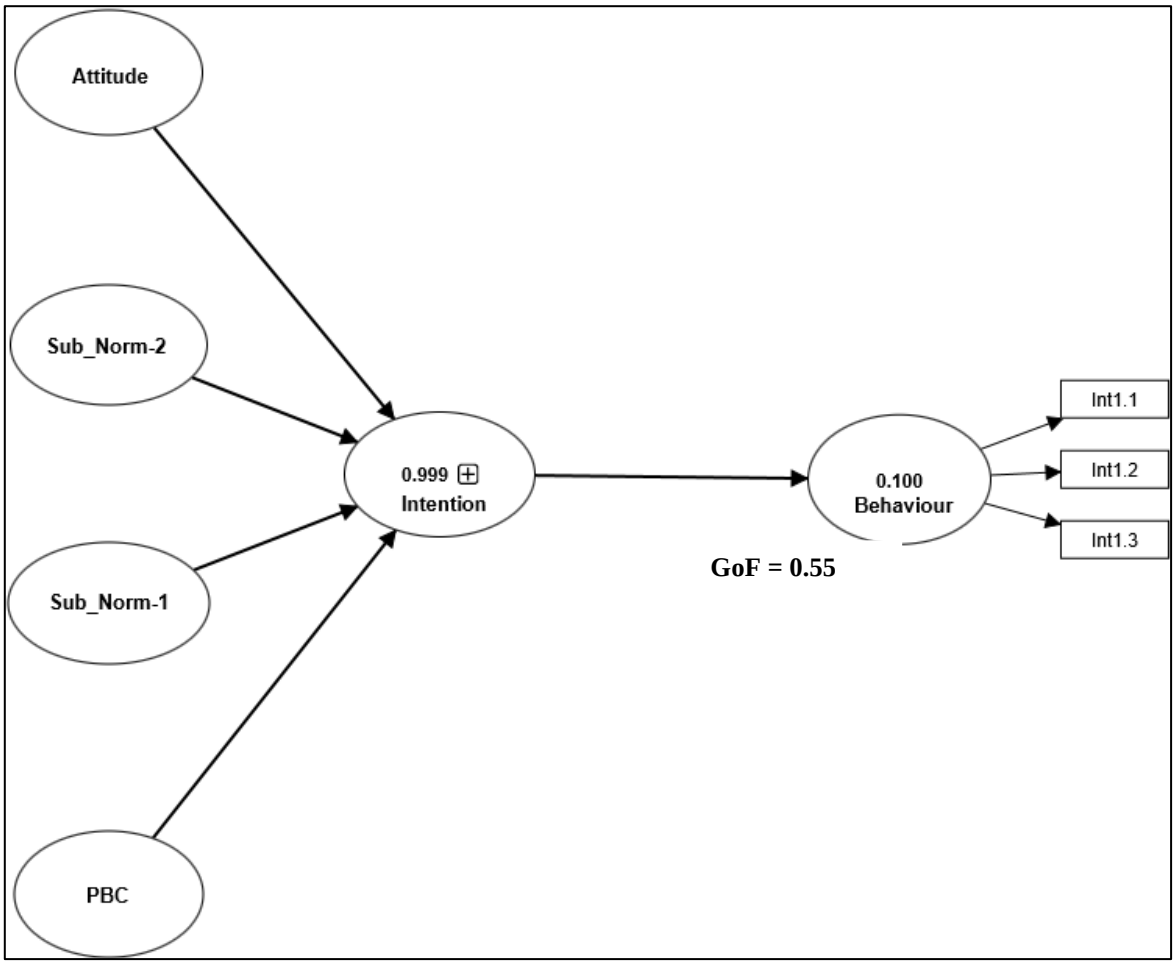


Figure 6-12: PLS Results of Path Analysis without Enforcement Moderator

The variance for the construct intention with an R^2 = 0.999 indicates a substantial value; however, behaviour of R^2 = 0.100 indicates a weak value without enforcement as a moderator. GoF was calculated at GoF = 0.55, above the value previously explained in Chapter 5 and as recommended by Tenenhaus et al. (2004) and therefore adequate and further support the model.

The path relationships for Attitude ➔ Intention (p = 0.000), Intention ➔ Behaviour (p = 0.009) and Sub_Norm 1 ➔ Intention (p = 0.033) are significant at p < .05. The path relationships between PBC ➔ Intention (p = 0.681) and Sub_Norm 2 ➔ Intention (p = 0.418) are not significant.

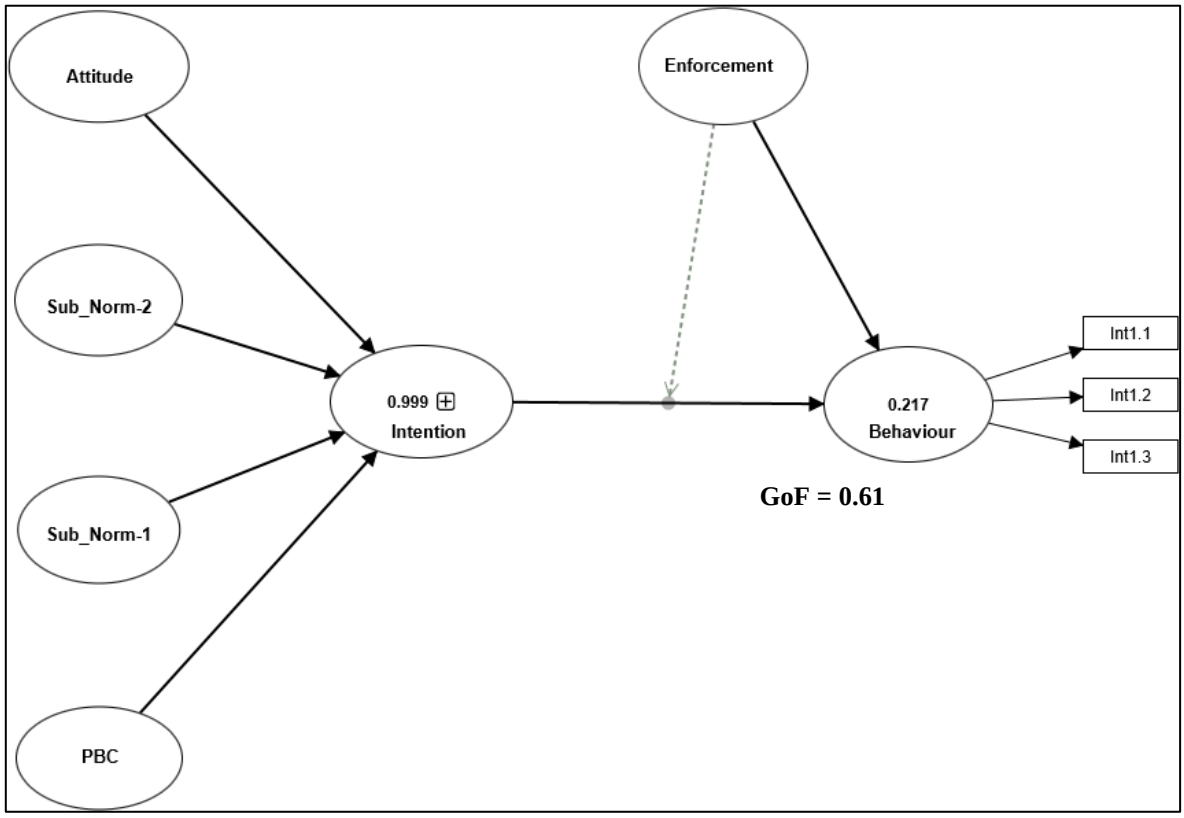


Figure 6-13: PLS Results of Path Analysis with Enforcement as Moderator

Figure 6-13 illustrates the relationship between intention and behaviour with enforcement being a moderator. In presence of enforcement as a moderator, it is likely that the owners' intention to execute the policy around life safety will be changed or modified. This depends on the level of enforcement being high or low. The moderation analysis will test the effect of enforcement on the likely change of owners' intention to adopt the policy or not to adopt (this is behavioural change).

The variance for the construct intention with R^2 = 0.999 indicates a substantial value; behaviour with a R^2 = 0.217 indicates a weak value with enforcement as a moderator. A GoF result was calculated at 0.61, above the value previously explained in Chapter 5 and as recommended by Tenenhaus et al. (2004) and therefore confirming the model is adequate and supported.

The path relationships of Attitude ➔ Intention (p = 0.000) and Sub_Norm 1 ➔ Intention (p = 0.03) are significant at p < .05. Enforcement ➔ Behaviour (p = 0.146), Intention ➔ Behaviour (p = 0.103),

PBC ➔ Intention (p = 0.676), Sub_Norm 2 ➔ Intention (p = 0.406) and Enforcement × Intention ➔ Behaviour (p = 0.328) are not significant.

6.5.8 Inclusion of Demographic Variables

The assessment of demographic variables, conducted through testing the model and corresponding to responses from building owners and their representatives, was included in Part A of the survey and will now be addressed. As detailed in chapters 4 and 5, the relevant question that relates to the hypothesis regarding the demographic variables criteria is:

> *H7 The inclusion of demographic variables (age, education, gender) influences the prediction for compliance of the policy for owners of multi-storey residential buildings.*

The test undertaken to determine the inclusion of demographic variables to influence the prediction for compliance of the policy used through SPSS was the Levene's test for equality. If there are no significant differences in the responses, there is no bias; therefore, the responses can be viewed the same. If the *f* statistic is not significant (p > .05), the responses can be viewed as not significant and therefore there are no differences in demographic responses. A total of four variables were tested: age, position in company, location (which state they reside in) and level of education. The results showed significance when using the Levene's test at p = 0.003; however, the *f* value was p = 9.819 and the two-sided p value was 0.315, showing no significance, and which can be accepted. Refer to Appendix I showing the t-test and Levene's test.

Analysing the responses from participants considering both the study-specific and demographic variables provides a degree of confidence that there are no significant differences between respondents and non-respondents in terms of the beliefs and attitudes to this study.

6.6 Final Results of the Model

Table 6-24 presents the conclusive outcomes of the model, delineating the findings related to the research question and hypotheses. Additional analyses and discussions pertaining to the final model's results are presented in Chapter 7.

Table 6-24: Final Results of Model

Research Question	No.	Hypothesis	Result Without Enforcement	Result With Enforcement
To what extent do the constructs within the theory of planned behaviour (attitude, subjective norm and perceived behavioural control) influence the intention of building owners, companies and owners' corporations that own multi-storey residential apartment buildings to maintain the fire and life safety systems in their respective buildings? How is policy implemented in practice within a deregulated building regulation environment to ensure compliance of statutory maintenance for building owners and companies including owners' corporations that own multi-storey residential apartment buildings in NSW and Victoria?	H1	A positive attitude toward maintaining fire and life safety provisions (through the policy) is positively related to behavioural intention to do so.	Supported	Supported
	H2	Subjective norms (support from important referents being, family, friends and peers) is positively related to the behavioural intention to do so (to undertake the act).	Supported	Supported
	H2.1	That support from the regulator is positively related to the behavioural intention of the act (to undertake the act).	Not supported	Not supported
	H3	That perceived behavioural control is positively related to behavioural intention to do so (to undertake the act).	Not supported	Not supported
	H4	A positive intention and ability to comply with the act is positively related to the behaviour to do so.	Supported	Not supported
To what extent do penalties provide a compliance mechanism (compliance theory) regarding a building owner's obligations to maintain their building's fire and life safety provisions?	H5	The association between intention and behaviour will be moderated by enforcement of the policy by the regulator such that the association will be significantly stronger when a high level of enforcement is present.	Supported	Not supported
Is the TPB a good fit to establish a building owner's intention to carry out statutory maintenance on their respective multi-storey residential apartment building?	H6	That the TPB is a good fit to establish compliance of the policy regarding ESM maintenance of multi-storey residential buildings.	Supported	
Do demographic variables contribute to undertaking the intention to carry out statutory maintenance on multi-storey residential apartment buildings?	H7	The inclusion of demographic variables (age, education, gender) influences the prediction for compliance of the policy for owners of multi-storey residential buildings.	Supported	

6.7 Conclusion

This chapter has provided the results of the theoretical model used, being the TPB to influence an individual's intention and ultimately behaviour – in this instance undertaking fire and life safety maintenance requirements on multi-storey residential buildings. The survey approach was discussed in detail and provided the raw data from regulators' (local governments in NSW and Victoria) building and fire safety departments to confirm that the policy through regulation is not being complied with. Although the number of usable responses from councils were relatively small across the two states, only local governments with known multi-storey apartment buildings were contacted in NSW. The actual number of residential apartment buildings subject to this survey was estimated at 36,726. The second survey was targeted at property owners and their representatives to determine Ajzen's TPB regarding the policy to maintain a building's fire and life safety systems for multi-storey residential apartment buildings.

Details of all responses and contacts made were extensive, with a response rate of 30% for NSW and 63% for Victoria, thereby exceeding a non-response rate of 30% (Armstrong & Overton, 1977). Although the number of final usable responses was low at 54, the number of buildings that were subject to the survey was 1457, thereby providing substantial reach for multi-storey residential apartment buildings. It was determined that the response rate provided a confidence level of 90% (Veal, 2005).

The screening of the data confirmed that all outliers, including assessment of the Mahalanobis distance, were located and removed for clarity and consistency to provide a range of $p = 0.001$ to $p = 0.01$ (Kline, 2015; Leys et al., 2018; Tabachnick & Fidell, 2011), with no outliers greater that $p = 0.001$ present. The normality assessment confirmed the skewness and kurtosis distributions were within standard normality, being a range of –1 to +1 for skewness and –3 to +3 for kurtosis (Lewis-Beck et al., 2004). The multicollinearity analysis examined the correlations between the variables using SmartPLS4, and the reliability and validity assessment determined the consistency of the responses. The final assessment check to determine the assessment model was the discriminant validity assessment. This showed the cross loadings were within the maximum threshold ranges.

Evaluation of the model was undertaken based on Hair et al. (2011) and the assessment approach reviewed the collinearity and the significance of relationships to determine that the levels of R^2 were again within the values required. Bootstrapping of the path model was carried out using 5000 iterations that analysed the structural model with and without enforcement as a moderating effect. A slope analysis of intention and behaviour with enforcement as a moderator was undertaken that confirmed that there is a negative relationship when higher levels of enforcement are present. The findings from the GoF analysis delineated the relational pathways followed by the demographic

variables related to study, and then this chapter culminated with the ultimate and conclusive results derived from the model.

Chapter 7 will discuss the results in detail, including the implications of the findings. This chapter aims to provide a descriptive analysis of the effectiveness of the theoretical model in shaping an individual's intention and subsequent behaviour to maintain the fire and life safety systems in multi-storey residential apartment buildings in NSW and Victoria.

Chapter 7: Discussion and Implications

7.1 Introduction

This chapter will discuss the results as detailed in Chapter 6 and review the adequacy of Ajzen's theory of planned behaviour (TPB), including the current compliance or otherwise of the policy to maintain multi-storey residential apartment building in NSW and Victoria.

Section 7.1 provides a detailed introduction and format of the chapter and is followed by an overview of the study (section 7.2) that includes the research questions based on the findings of the literature and Ajzen's TPB. The chapter then proceeds into section 7.3 with the focus of examining the results from Chapter 6 and firstly covers the findings of policy compliance in NSW and Victoria by building owners and their representatives through data obtained by local government authorities (section 7.3.1). The chapter then moves to address the results of the hypotheses (section 7.3.2) in tabular format, showing the results with and without enforcement as a moderator. The chapter then discusses the results of Ajzen's TPB constructs for attitude and intention (section 7.3.3), subjective norms and intention (section 7.3.4), perceived behavioural control and intention (section 7.3.5), intention and behaviour (section 7.3.6) and enforcement of the policy between intention and behaviour (section 7.3.7). Enforcement is then discussed as a moderating affect (section 7.3.8), describing the slope relationships to demonstrate the regulators' overall role in ensuring community safety through enforcement of the legislation. The chapter then moves onto to discuss Ajzen's TPB and whether this is a good fit for this study (section 7.3.9), followed by the inclusion of demographic variables (section 7.3.10) and whether these have any effect on the outcomes of behaviour.

Section 7.4 discusses the overall findings of the research questions, addressing each question in consideration of the obtained results in sections 7.4.1 to 7.4.5. Section 7.5 delves into the practical and theoretical implications, and the chapter concludes by summarising the results and encapsulating the research outcomes and their alignment with the theory and rationale. The chapter concludes with a comprehensive summary of the results (section 7.6).

7.2 Overview of the Study

This study has confirmed the discordant and fragmented approach to community safety in multi-storey residential apartment buildings across Australia. This fragmentation stems from a predominantly deregulated building management policy post construction, marked by significant inconsistencies across states and territories. Utilising Ajzen's TPB, this research establishes building owners' attitudes, subjective norms and perceived behavioural control to influence their intention and

ultimately to undertake the critical responsibility of maintaining their buildings' fire and life safety provisions.

Existing literature suggests that more research and understanding is needed in building regulation and enforcement (Van der Heijden & de Jong, 2009), with some researchers suggesting that inclusiveness is required regarding compliance for stakeholders and policymakers to improve compliance options (Nwadike & Wilkinson, 2021), with enforcement at its core (Nwadike & Wilkinson, 2022). The adoption of a performance-based building code for the design and construction of buildings has increased the pressure on compliance options within industry to be robust to reduce defects, highlighting that professionals require further assistance with compliance (Caballero et al., 2022; Meacham, 2009).

This research, based on the existing literature, proposed the following objectives:

- To review implications for owners of multi-storey residential buildings who do not maintain their essential safety measures as required by policy.
- To determine the links and interdependencies between building owners and their representatives, including owners' corporations, and their level of understanding of the performance-based building code and the regulation regarding statutory maintenance obligations.
- To determine factors associated with sustained compliance for essential safety measures from owners, companies and owners' corporations.

To respond to the research objectives, it was decided to use the theoretical framework by Ajzen – the TPB – with the inclusion of enforcement as a moderating affect to influence or otherwise the behaviour of building owners and their representatives regarding undertaking the act, being the maintenance of fire and life safety provisions for multi-storey residential apartment buildings. The following research questions were therefore developed based on the TPB.

1. *To what extent do the constructs within the theory of planned behaviour (attitude, subjective norm and perceived behavioural control) influence the intention of building owners, companies and owners' corporations that own multi-storey residential apartment buildings to maintain the fire and life safety systems in their respective buildings?*
2. *How is policy implemented in practice within a deregulated building regulation environment to ensure compliance of statutory maintenance for building owners and companies including owners' corporations that own multi-storey residential apartment buildings in NSW and Victoria?*
3. *To what extent do penalties provide a compliance mechanism (compliance theory) regarding a building owner's obligations to maintain their building's fire and life safety provisions?*

4. *Is the TPB a good fit to establish a building owner's intention to carry out statutory maintenance on their respective multi-storey residential apartment building?*
5. *Do demographic variables contribute to undertaking the intention to carry out statutory maintenance on multi-storey residential apartment buildings?*

Having discussed the overview of the study with the research objectives and questions, the next stage will discuss the findings of the model. The results of the actual compliance of the findings from local government will be discussed in the first instance, followed by the findings of the hypotheses.

7.3 Discussion of the Findings

7.3.1 Compliance with the Policy

As discussed in Chapter 5, to establish the actual compliance of the policy in NSW and Victoria a survey was conducted via local government authorities. This survey essentially established the compliance rate of fire safety maintenance within the confines of respective local government areas. The survey asked local government authorities via their building or fire safety departments about the number of multi-storey residential apartment buildings that are subject to the policy and then to provide the compliance rate of those buildings, based on the inspection regime of each council authority. The number of responses from local government areas were 52, equating to an estimated 36,726 multi-storey residential apartment buildings across Victoria and NSW. The low number of responses was from councils that contained residential apartment buildings within their municipality. Of the 36,726 individual buildings that were subject to the policy, to determine the compliance rate, the questionnaire asked how many fire safety maintenance inspections were undertaken in the preceding year; the totals were 612 for NSW and 964 for Victoria.

Having established the number of buildings and the number of inspections undetaken in the preceeding year to check on complinace with the policy, the questionnaire then asked about the compliance rate of those inspections. Of the 612 buildings inspected in NSW, 220 were found to be compliant, or 36%, as compared to Victoria where of the 964 buildings inspected, 127 were found to be compliant, or 13%.

The results from this research to determine the actual compliance with the policy appear to be in contradiction to the release of a report conducted by the NSW government and the Strata Association of NSW, where they determined a "*low level of non-compliance, which is a positive outcome given the critical role that fire safety systems play in protecting strata buildings and their occupants*" (NSW Government & Strata Community Association, 2021). This report appears to review why annual fire certificates were not submitted to their respective local government areas (see section 2.7 for further information on legislative compliance requirements), whereas the actual inspection and checking of

compliance by regulators revealed numerous noncompliance's with legislation, in contrast to previous studies and research undertaken.

Comments from the questionnaires from council also recognise this aspect.

> *Whilst undertaking ESM audits throughout the municipality, there has been countless occasions where a fire service has been 'maintained' by a person and it is still non-compliant. A major example of this is Fire Hose Reels in that the maintenance contractor stamps the ESM as compliant and tested, however the fire hose reel is not secured in an interlocking device as per the requirements of the relevant Australian standard.*
>
> *Owners generally do not know or care about ESM as it is costing them extra money. VBA should have a program to make the owner or real estate agent aware of their responsibility. Building Insurance Companies should get involved like requiring an AESMR to be submitted as part of their application for a new or renew the building insurance policy.*
>
> *We issue many penalties for failing to submit statements after a reminder letter, and 2 warnings and yet we are often challenged as to why we penalise owners for failing to meet their obligations.*
>
> *Most parties listed have no knowledge or understanding of the policy.*

On the other hand, as the National Construction Code (NCC) progressively becomes more complex in assessment methodologies, this creates greater tailored fire safety systems that building owners and technicians are unable to comprehend (Better Regulation, 2023; Carter, 2019), with state-based regulators to monitor the outcomes of the decisions and processes (Coglianese et al., 2003; May, 2007). As it is the role of the regulators in NSW to administer and monitor fire safety regulations for multi-storey residential apartment buildings (New South Wales Government, 2022, 2023; New South Wales Government Department of Fair Trading, 2023; NSW Government Department of Planning, 2023) and to a lesser extent in Victoria (Victorian Building Authority, 2023; Victorian Government, 2020, 2023), the level of expertise and understanding by regulators when checking on compliance of fire and life safety systems lack the knowledge to understand complex fire safety systems and have less expertise than those they regulate (Spinardi, 2019).

Similarly, the intricate nature of contemporary building codes, resource limitations among regulators and a reliance on reactive enforcement understanding (Burby et al., 1998) may present a misleading perspective when assuming 100% compliance, as highlighted by Heyes (2000). This complexity also contributes to challenges in enforcement and is further referenced by the regulators through their responses to the questionnaire in the policy.

Unless well-educated or involved in the policy, the community are generally oblivious. There is no social pressure by any means to comply with the policy. Compliance with the policy is legislated and has uptake from Council. This is not strongly driven by Council and is up to individual officers of the Council to drive and enforce … Better education is needed for property owners.

The development of the system has been ignored and the implications of requiring the implementation and oversight misunderstood.

Owners of buildings are not always willing to maintain their buildings and generally try and pass this function to the tenant.

It is not being done now so you will have to have a good think about how to do it in the future.

Failure for Councils to recognise the significance of the statutory roles and the staff required.

Most parties listed have no knowledge or understanding of policy.

Performance-based building codes and the introduction of privatisation for the design, approval and compliance of buildings in Australia (Van der Heijden, 2010; Van der Heijden & de Jong, 2009) brings enforcement as a co-regulatory approach. However, this approach has not always been successful, as referenced in the responses by the regulator as part of this research.

The level of regulatory compliance at construction is sometimes questionable and often it is found noncompliance issues are identified which are required to be addressed as part of an audit process.

The evaluation leads to the conclusion that the policy requiring building owners to uphold fire and life safety systems post occupancy is ineffective, as the actual compliance rate falls short of ensuring sufficient community safety.

Having discussed the findings of the overall compliance of the policy through the results from local governments, the next part of the chapter will discuss the results of the hypotheses.

7.3.2 Findings of Hypotheses

The hypotheses results are shown in Table 7-1.

Table 7-1: Hypotheses Results

No.	Hypotheses	Result Without Moderator	Result With Moderator
H1	A positive attitude toward maintaining fire and life safety provisions (through the policy) is positively related to behavioural intention to do so.	Supported	Supported
H2	Subjective norms (support from important referents being, family, friends and peers) is positively related to the behavioural intention to do so (to undertake the act).	Supported	Supported
H2.1	That support from the regulator is positively related to the behavioural intention of the act (to undertake the act).	Not supported	Not supported
H3	That perceived behavioural control is positively related to behavioural intention to do so (to undertake the act).	Not supported	Not supported
H4	A positive intention and ability to comply with the act is positively related to the behaviour to do so.	Supported	Not supported
H5	The association between intention and behaviour will be moderated by enforcement of the policy by the regulator such that the association will be significantly stronger when a high level of enforcement is present.	Supported	Not supported
H6	That the TPB is a good fit to establish compliance of the policy regarding ESM maintenance of multi-storey residential buildings.	Supported	
H7	The inclusion of demographic variables (age, education, gender) influences the prediction for compliance of the policy for owners of multi-storey residential buildings.	Supported	

As can be seen from Table 7-1 there were eight hypotheses for this study, with and without enforcement as a moderating factor. Four of the six hypotheses that directly deal with Ajzen's TPB are supported without enforcement as a moderator, and four of the six hypotheses with enforcement as a moderator are not supported.

Having discussed the relationships with the study showing the summary of the results, I will now discuss in detail the results of this study.

7.3.3 Attitude and Intention

H1: That a positive attitude toward maintaining fire and life safety provisions (through the policy) is positively related to behavioural intention to do so.

H1 essentially looks at the requirement for a person's beliefs of attitude, as this is expected to be the predictor of the intention to undertake the act (Ajzen, 1991). Tested through Ajzen's TPB, attitude has a significant effect on the behaviour to do so, with a *p* value of 0.000 that is significant and a path model coefficient of $\beta = 0.844$ that is within the values of –1 to +1, as suggested by Hair et al. (2021). This is consistent with Ajzen's TPB that attitude is an antecedent towards intention to ultimately influence a behaviour of the individual. The result for the *p* value of 0.000 is significant and therefore reinforces Ajzen's TPB that attitude directly relates to behaviour intention (Hassan et al., 2016). The results from the survey regarding intention show that there was a significant effect on attitude to intention, and this is therefore supported.

7.3.4 Subjective Norms and Intention

Subjective norms refer to the perceived social pressure to undertake the behaviour and include expectations from significant others in the individual's life or the community (Ajzen, 1991). This could include family, friends, colleagues, building occupants or relevant authorities who may express their opinions or expectations about the importance of keeping the fire and life safety systems maintained.

H2: Subjective norms (support from important referents being, family, friends and peers) is positively related to the behavioural intention to do so (to undertake *the act).*

H2 discusses subjective norms from important referents such as family, friends and peers. These place social pressures from society on people to undertake the act. Tested through Ajzen's TPB, subjective norms has a significant effect on intention to undertake the act in that a *p* value of 0.03 is significant and the path model coefficient on behaviour is $\beta = 0.36$ and is within the values of –1 to +1, as suggested by Hair et al. (2021), while a value closer to negative suggests a positive relationship between the constructs. As demonstrated in H2, the pressure from important individuals such as family, friends and peers will influence an individual's intention to engage in a behaviour, consistent with Ajzen's TPB. This highlights the importance perceived social pressure has to undertake or approve of the task.

The core results from the data, as recommended by Fishbein and Ajzen (2010), conclude that the results are of significant correlation. The core results from the questions conclude that important referents expect that the individual will undertake the behaviour to maintain the building's fire and life safety provisions.

H2.1 is concerned with the regulator and what impact the regulator has on the outcome of subjective norms to intention, in this instance state and local government authorities.

> *H2.1: That support from the regulator is positively related to the behavioural intention of the act (to undertake the act).*

The results conclude for H2.1 that the coefficient $\beta = -0.009$ is outside of the values of –1 to +1, as recommended by Hair et al. (2021), with *p* values of 0.418; therefore, this is not significant.

This non-significant result appears to be from a lack of support from the regulator, being local and state government authorities, despite recent reforms and further community safety information to building owners and strata managers of multi-storey residential apartment buildings in NSW and Victoria (New South Wales Government, 2022, 2023; New South Wales Government Department of Fair Trading, 2023; NSW Government Department of Planning, 2023; Victorian Building Authority, 2023; Victorian Government, 2020, 2023). As discussed in Chapter 4, subjective norms and normative beliefs will lead to assistance for the individual to complete the behaviour (Ajzen, 1991; Knabe, 2009); however, the data does not support the proposition that the regulator has adequately conveyed social pressures and norms regarding the behaviour, despite numerous attempts to do so. The findings indicate a lack of support for the notion that building owners and strata managers perceive the regulator as providing support. This is evident from direct comments sourced from the questionnaire.

> *In conversations with these regulators, it seems they are not concerned with the building operations and ESM systems themselves but concerned that if something were to go wrong that they will have to file a coroner's reports.*

> *If the regulators care about the systems, then a process of education needs to be adopted, not a random inspection and issuance of an order that has no context or understanding of the current difficulties being faced on the site.*

The issue of protection of the public regarding fire safety of residential apartment buildings following the Lacrosse and Grenfell cladding fires bought community safety to public attention (Melser, 2023), along with fire and life safety system management and maintenance processes for buildings (Meacham, 2022). Governments and regulators need to be cognisant of the subjective norms to building owners and strata managers to essentially moderate the effect on intention. This is further supported by recent research that concludes that subjective norms are a significant factor to enabling owners to undertake the act through perceived behaviour control (PBC) and ultimately the intention to undertake the act (La Barbera & Ajzen, 2020).

7.3.5 Perceived Behavioural Control and Intention

According to the TPB, beliefs in the ability of an individual to exert control are considered the main factors to enable a behaviour or the act of doing (Ajzen, 2019). Although an individual has many behavioural beliefs, it is the salient beliefs that are the most important, with the ease or otherwise of undertaking the behaviour including previous experiences regarding the behaviour. H3 deals with support from the regulator to comply with the policy, including providing encouragement and training. To establish the hypothesis the following was explored.

> *H3: That perceived behavioural control is positively related to behavioural intention to do so (to undertake the act).*

The results show the path coefficient of $\beta = 0.061$ is outside of the –1 to +1, as suggested by Hair et al. (2021), with a *p* value of 0.681 that is greater than 5% ($p > .05$); therefore this is not supported. Interestingly, when enforcement is analysed as a moderating effect the results are further outside of the acceptable range, with the value $p = 0.676$. This demonstrates that involvement of the regulator has an increasing negative effect on PBC.

Given that PBC considers the ability or otherwise and ease for an individual to undertake the behaviour and the salient beliefs they have regarding the behaviour, this demonstrates that building owners and their representatives don't receive adequate support from the regulator and do not feel that they can undertake the behaviour or understand the legislative requirements.

Regarding the questionnaire for PBC and intention, the respondents expressed that they feel the regulator does not provide adequate support to comply with the policy, including for specialised training and correspondence. Interestingly, the respondents from the questionnaire describe their thoughts on undertaking the act and the involvement of the regulator.

> *Current system puts all the responsibility on the owners' corp but no tools to implement the requirements and no expert help when you need it.*

> *Training for Strata Managers would be very helpful – whilst most of us use the services of external ESM contractors – more knowledge on the subject would be helpful to all.*

> *I think this is such a neglected industry there is no support or training and a lot of people know what they are doing and find it too hard.*

> *I think fire policies can get too complicated and too expensive for owners' corporation, especially with the new buildings.*

It is necessary, but sometimes it is too complex and especially for new buildings, we noticed a trend of those measures getting more complicated and it is a large ongoing running costs. It would be good to regularly check whether it is necessary for some fire measures to be there in the first place.

However, elements make it difficult such as the requirement that annual inspections be undertaken no more than 3 months prior to submission of the statement. It can be difficult to attend to all corrective action items in that period of time.

Ripple effect from legislative changes take considerable time and effort to implement.

Maintaining fire safety systems is necessary but is often too complex to implement.

As can be seen from these responses, there does not appear to be adequate support by the regulator for building owners and their representees to undertake the behaviour. This is contrary to the PBC, which posits that ability to exert control is considered a main factor that would impede or facilitate a behaviour, thereby influencing the behaviour (Ajzen, 2019). Therefore, the results for PBC are not supported, as building owners and their representatives, including strata mangers, do not feel that they are receiving adequate support or assistance and are therefore unable to undertake the behaviour.

Recent research into the TPB regarding the relationship between subjective norms and PBC considers that subjective norms and PBC are linked to intention, in that motivation to comply where PBC is greater increases the importance of attitude to predict intention (La Barbera & Ajzen, 2020). A recent study of consumer confidence in NSW regarding multi-storey residential apartment buildings concluded that only three in 10 residents in NSW confirm that they are confident to purchase an apartment (Abadee, 2023). The results of this study support this view. It is suggested from the responses that additional support and assistance from the regulator to building owners be provided to empower them with the capability to carry out the necessary actions.

7.3.6 Intention and Behaviour

The TPB posits that intention is the strongest motivator to undertake and engage in the behaviour (Ajzen, 1991). A positive intention and ability to undertake the behaviour therefore should result in compliance with the regulation that requires multi-storey residential apartment buildings are compliant and enhance community protection.

H4: A positive intention and ability to comply with the act is positively related to the behaviour to do so.

The results show that the path coefficient without enforcement as the moderator is β = 0.317 and within the values of –1 to +1, as suggested by Hair et al. (2021), with a value closer to negative suggesting a positive relationship between the constructs. The *p* value is 0.009 and is significant ($p > .05$). This demonstrates that the relationship between intention and behaviour is significant and will place a positive intention on ability to undertake the behaviour, being the maintenance of fire and life safety provisions on multi-storey residential apartment buildings.

Interestingly, when enforcement is calculated as a moderating effect the path co-efficient of β = 0. 249 is within the values of –1 to +1; however, the *p* value is 0.103 and is greater than .05, showing it is not significant. This therefore means that enforcement again has a negative effect on intention and ultimately behaviour.

Having discussed the main constructs of the TPB, I will now discuss the effect of enforcement by the regulator on intention and behaviour.

7.3.7 Enforcement of the Policy between Intention and Behaviour

Smart (2013) postulates that enforcement through penalties can provide compliance mechanisms (compliance theory) and that compliance with the policy or the regulation can be achieved by providing a significant penalty. According to Ajzen (1991, p. 199) additional constructs could be added to the TPB; however, this would need to improve the quality and predictive aspects of the behaviour. Therefore, the following hypothesis was added to the model as a moderator to behaviour to influence compliance of the policy through coercive styles (Anderson, 2010; Braithwaite, 2017; Earnhart & Glicksman, 2015).

> *H5: The association between intention and behaviour will be moderated by enforcement of the policy by the regulator such that the association will be significantly stronger when a high level of enforcement is present.*

The results show the direct influence on intention to behaviour path model coefficient is β = 0.249, within the values of –1 to +1 as suggested by Hair et al. (2021), with a value closer to negative suggesting a positive relationship between the constructs. The *p* value is 0.103 and is considered not significant ($p < .05$). Enforcement directly to behaviour has a coefficient of β = 0.246, again within the value of –1 to +1; however, a *p* value of 0.146 is not significant ($p < .05$).

This is also verified from the questionnaire asking respondents if they are confident that they can take responsibility, carry out all the fire and life safety maintenance requirements and thereby comply with the regulation and policy. Enforcement when the regulator is involved impacts on behaviour negatively. The responses from the questionnaire also indicate the role of the regulator when enforcement is undertaken.

The regulators do not seem to understand the practical implications of their auditing and myself, working across a large portfolio from a risk perspective, see constant differences in the approaches and requirements from different regulatory bodies. In conversations with these regulators, it seems they are not concerned with the building operations and ESM systems themselves but concerned that if something were to go wrong that they will have to file the coroners reports. If the regulators care about the systems, then a process of education needs to be adopted, not a random inspection and issuance of an order that has no context or understanding of the current difficulties being faced on the site.

The biggest unresolved issue around AFSS [annual fire safety statement] compliance in NSW is that the interpretation of the compliance regulations are reliant on the AFSS certification companies who self-certify and are commonly the organisation who conducts the expensive repairs after identifying the shortfalls they feel exist … It is a trust system which is abused and Strata Plans feel they are over a barrel if works are not conducted as the certification is not independently audited or confirmed by any regulator.

Requirements change each year. Sometimes costing tens of thousands of dollars. It's left to us to explain to the owners why they have to pay for it [other than they'll get massive fines if they don't].

The survey responses and subsequent analysis reveal adverse implications for building owners and their representatives. This stems from inconsistencies in the enforcement practices employed by regulators across various local government districts, despite the existence of state-based regulations aimed at ensuring compliance. In essence, there is a lack of uniformity in the enforcement of policies not only between local government authorities but also across state-based legislative regimes.

7.3.8 Enforcement of the Policy as a Moderator

Inspired by the research of Smart (2012) into tax compliance in New Zealand that explored the effectiveness that compliance and penalties have on taxpayers to influence attitudes, this research added compliance regimes by the regulator as a moderating effect. This is to determine the added involvement of the regulator in a positive or negative way that would contribute to building owners or their respective representatives undertaking the behaviour. Further studies regarding factors associated with fire preparedness in national disasters conclude that regulator roles and regulation to ensure compliance will not be supported by building owners (Kurata et al., 2023).

The moderating effect of enforcement to the relationship of intention and behaviour and directly to behaviour through the analysis is not supported. The slope relationship in Figure 6-11 demonstrates

that higher enforcement by the regulator is intensified negatively to behaviour by building owners and strata managers.

The evidence provided in the responses and analysis indicates that building owners lack sufficient support to engage in the intended behaviour with enforcement as a moderator (H4 and H5). H4 and H5 show coefficients of $\beta = 0.249$ and $\beta = 0.246$, and p values of 0.103 and 0.106, respectively, and are not significant ($p < .05$). The remaining values for the path coefficients are not supported by the data when enforcement is added as a moderating effect. H2.1 and H3 have values of $\beta = –0.009$, $\beta = 0.061$, and $p = 0.406, 0.676$ ($p < .05$), respectively, that are also not significant and not supported. Based on these results, and the responses from the questionnaire, the regulator should provide further training and communicate with building owners and strata managers and the wider community regarding the policy and regulatory requirements of maintaining a building.

Notably, the NSW government (2019) acknowledged the intricacies and flaws in multi-storey residential apartment buildings that contribute to significant structural deficiencies. In response, they appointed a Building Commissioner to investigate the root causes of these defects, aiming to restore confidence among consumers and the public regarding these buildings (NSW Government & Strata Community Association, 2021). Recent research however has indicated that enforcement by the regulator faces risks, including abuse and violence (Law et al., 2023). However, the questionnaire and the data conclude that further involvement to collaboratively assist building owners and strata managers to comply is needed. Further discussions on recommendations regarding the regulators and their approach to enforcement regarding the legislative requirement to maintain multi-storey residential apartment buildings will be discussed in the concluding chapter.

7.3.9 TPB is a Good Fit

As PLS-SEM is essentially not suitable or is based on goodness of fit (GoF), the evaluation measure and data analysis was based on bootstrapping procedure. The GoF was interpreted by the geometric mean of the R^2 values that were averaged, and the communality of the variables taken from Fornell and Larcker measures were multiplied from the R^2 latent variables as determined by Henseler and Sarstedt (2013) and Tenenhaus et al. (2005). The indices obtained to explain the variability of the model, being the R^2 value for the endogenous constructs where the average communality of the variables is taken from Fornell and Larcker (1981) (Hamid et al., 2017) and measure multiplying the values from the R^2 latent variables.

> *H6: That the TPB is a good fit to establish compliance of the policy regarding ESM maintenance of multi-storey residential buildings.*

Findings show that the overall model fit indices are consistent with the model relationships, as recommended by Tenenhaus et al. (2004). The GoF value was calculated at 0.55 without enforcement as a moderator and 0.61 with enforcement as a moderator. The values obtained are above the value recommended by Tenenhaus et al. (2004) and take in both the measurement and structural models performance and are therefore adequate and further validate the model. The overall GoF of the model was validated by the relationships of the model that provided significant results for the constructs. The model, with and without enforcement as a moderator, was proved to be adequate and consistent overall with the TPB.

7.3.10 Inclusion of Demographic Variables

The major respondents to the questionnaire were strata managers who collectively manage over 1457 individual apartment buildings. Therefore, it was important to understand their demographic details, including age, gender, location and education, to determine if this is an influencing factor in undertaking and understanding the fire and life safety maintenance on complex residential apartment buildings.

> *H7: The inclusion of demographic variables (age, education, gender) influences the prediction for compliance of the policy for owners of multi-storey residential buildings.*

Some 64% of respondents identified as male and 36% identified as female; 15% of respondents had a VET sector diploma, 26% had an undergraduate degree, 16% had a postgraduate diploma and 16% had a master's degree.

Levene's test for equality of variance established that there were no statistically significant differences, suggesting consistency in responses when examining the demographic variables of the responders. The results showed significance when using Levene's test, at $p = 0.003$; however, the F value was $p = 9.819$ and the two-sided p value was 0.315, showing no significance; this result can be accepted.

Consequently, the demographic variables pertaining to the outcomes of the model assessing the intention to undertake the act were supported by the analysis.

Having discussed the findings of the hypotheses and overall compliance of the policy through the results from local governments, the next part of the chapter will discuss the research questions that ultimately answer the research objectives as discussed in section 7.2.

7.4 Discussion of Findings of the Research Questions

Based on the research objectives, the research questions were formulated to test the hypotheses.

7.4.1 Findings for Research Question 1

To what extent do the constructs within the theory of planned behaviour (attitude, subjective norm and perceived behavioural control) influence the intention of building owners, companies and owners' corporations that own multi-storey residential apartment buildings to maintain the fire and life safety systems in their respective buildings?

Using Ajzen's TPB, constructs were developed and examined through the measurement model evaluation using SmartPLS4. Hypotheses H1, H2, H2.1, H3 and H4 were developed to respond to the above research question. Building owners' responses to Part B of the survey provided the data needed for evaluation of the model and constructs to occur. The use of Ajzen's TPB was confirmed as being an appropriate model to determine what influences the intention and ultimately the behaviour to undertake maintenance of fire and life safety provisions of building owners and their representatives of multi-storey residential apartment buildings and their ability to respond when required for self-regulation (Ajzen, 2005, 2011).

The results confirmed that the relationships between Ajzen's TPB were positive between attitude and intention, subjective norms and intention, and intention and behaviour; however, the relationship between perceived behavioural control and intention was not supported. This appears to be from the lack of ability or perceived ability that building owners have to undertake the act or behaviour due to complex legislative and irregularly enforced policy styles by the regulator to provide adequate training and assistance. Overall, the TPB was demonstrated to influence the intention of building owners and strata managers who maintain multi-storey residential apartment buildings.

7.4.2 Findings for Research Question 2

How is the policy implemented in practice within a deregulated building regulation environment to ensure compliance of statutory maintenance for building owners and companies including owners' corporations that own multi-storey residential apartment buildings in NSW and Victoria?

Part A of the questionnaire that was sent to local government authorities in NSW and Victoria was used to determine the actual compliance rate of the buildings, whereas the questionnaire that was sent to building owners and their representatives determined the efficacy of the policy through regulation of building owners. Notably, this study reveals a lack of coherence in building policies concerning fire and life safety maintenance in Australia. The decentralised nature of policy administration, with each jurisdiction implementing its unique approach, coupled with ad hoc enforcement policies at the local government level, underscore the discordance in the overall framework.

No hypothesis was formulated for this research question. The measurement model employed validated the relationships among the constructs. However, the primary utilisation of the data came from Part A

of the survey, directed towards local government authorities, demonstrating the compliance rate. This was discussed in detail in chapters 6 and 7.

The implementation of the policy in Victoria and NSW was detailed in Chapter 2, and the compliance rate or otherwise was detailed in chapters 6 and 7. In practice the policy to maintain a building's fire and life safety system appears not be fully understood by building owners and, importantly, not to be addressed by local governments. Regarding the compliance or otherwise of the policy, only 36% of buildings in NSW and 13% in Victoria were found to be fully compliant, with the policy. Survey results indicate a lack of support from building owners and strata managers regarding their capacity to carry out fire and life safety maintenance. Furthermore, private certification and administration conducted by maintenance personnel appear ineffective, as evident from the notable number of noncompliant buildings discovered.

7.4.3 Findings for Research Question 3

To what extent do penalties provide a compliance mechanism (compliance theory) regarding a building owner's obligations to maintain their building's fire and life safety provisions?

Smart (2013) asserts that deterrence theory serves as a means to establish compliance, whereas (Braithwaite, 2017) details that compliance can be attained through two distinct styles: catalytic and coercive. Catalytic style has been explored within this study, as this mostly resembles the outputs required using Ajzen's TPB that seeks to motivate an individual to undertake the act, being compliance in a positive way through education, technical advice and financial inducement (Weske et al., 2018). Despite the partial support for the research of Smart (2013), the application of the catalytic style significantly shapes the PBC of building owners and their representatives. Conversely, the attempt to enforce compliance through a coercive style involving sanctions (Anderson, 2010; Earnhart & Glicksman, 2015) was ultimately not substantiated by the outcomes of the model employed in this study.

H5 was developed to respond to this research question and allowed for four items to be reviewed using enforcement as a moderating factor to achieve behaviour. The results show through the model that enforcement by the regulator has a negative effect on building owners and their representatives, therefore this was not supported. However, respondents to the survey questionnaire advised that further support and training was required to assist them to comply with the policy and that this should be completed by the regulator. This was also confirmed by the results of H3 that building owners and their representatives did not feel confident or have the ability to undertake compliance procedures required by the policy to maintain their building's fire and life safety provisions.

7.4.4 Findings for Research Question 4

Is the TPB a good fit to establish a building owner's intention to carry out statutory maintenance on their respective multi-storey residential apartment building?

This research question did not have a specific direct hypothesis measure. Instead, the entire theoretical model was employed. Additionally, existing research, being the TPB, was considered suitable for investigating individuals' impulsivity and their capacity to respond while self-regulating (Ajzen, 1991).

To assess the suitability of the TPB in gauging building owners' intention to undertake specific acts or behaviours, two primary avenues were explored. The first involved the GoF index, while the second drew insights from existing research. Concerning the GoF index, the interpretation entailed the computation of the geometric mean based on the averaged R^2 values. Furthermore, the variables' communality, derived from Fornell and Larcker measures, was multiplied by the latent variables' R^2, as determined by Henseler et al. (2015) and Tenenhaus et al. (2004). The overall GoF path model relationships with and without enforcement as a moderator confirmed that the model was adequate and supported.

The second aspect, confirming the suitability of the TPB, was validated through the study's research, which comprised eight hypotheses, incorporating enforcement as a moderating effect. Two of the four hypotheses that did not include enforcement as a moderating effect were supported. The comprehensive hypothesis evaluating the TPB's appropriateness for the study was therefore supported. Regarding hypotheses involving enforcement as a moderating effect, two gained support while four did not.

7.4.5 Findings for Research Question 5

Do demographic variables contribute to undertaking the intention to carry out statutory maintenance on multi-storey residential apartment buildings?

Demographic variables including age, location, gender and education level were used in this study to determine if these contribute to undertaking the intention to carry out the behaviour. Although demographic external variables may be considered inaccurate predictors of behaviours to a specific task (Ajzen & Fishbein, 1980), the study determined that demographic variables among strata managers were not a factor that influenced behaviour.

Levene's test for equality of variance determined that these were not substantially different, and therefore the responses were consistent and the variables regarding the results of the model to determine the intention to undertake the act were supported by the analysis.

7.5 Implications

Having discussed the results of the thesis in detail for councils and building owners, the practical and theoretical implications of the study will now be discussed.

7.5.1 Practical Implications

It has been demonstrated throughout this thesis that the use of performance-based building codes for the design and construction of buildings has increased risks to community safety for residents of multi-storey residential apartment buildings. This together with a deregulated building enforcement process across Australia has increased the risk for consumers, residents and the regulator. Previous events such as the Brunswick rooming house fire in 2006 that caused two deaths (White, 2009), the Kew Cottages fire in 1996 that claimed the lives of nine people with intellectual disabilities (Broome, 2020) and the Childers backpacker fire in 2000 that caused 15 deaths (Barnes, 2006) have highlighted the safety of people and residents in high-risk residential buildings. The cladding crisis that is prevalent now in Australia, brought about by fire events on multi-storey residential apartments such as the Neo 200 cladding fire in Spencer Street, Melbourne (Carter, 2019), the Lacrosse tower fire at Docklands (Badrock, 2016) and the Grenfell tower fire in London (Hackitt, 2018) has placed the spotlight on a deregulated building enforcement process across Australia when using performance-based building codes for the design, construction and maintenance of buildings. Anecdotal evidence through the author's extensive experience in undertaking fire safety audits on commercial buildings has acknowledged community safety concerns regarding fire and life safety maintenance since the introduction of the Victorian *Building Act 1993*. This Act placed more obligations on building owners to maintain their buildings with minimal or at times no assistance or support from government agencies.

Recently, some government authorities in Australia have acknowledged the risks and created a holistic approach to fire safety systems (Auditor-General of New South Wales, 2022; Queensland Fire and Emergency Services, 2023) in existing high-risk buildings. Concerns are recognised within the Australian industry and acknowledged by building surveyors and certifiers (Scimonello et al., 2022a, 2022b; Scimonello et al., 2019). However, it is only in recent times that governments have come to appreciate and comprehend the impact and significance of fire and life safety maintenance on community safety (Better Regulation, 2023; NSW Government & Strata Community Association, 2021).

This study represents an initial effort to furnish comprehensive data and evidence and highlight the potential risks to community safety associated with the maintenance of fire and life safety systems in multi-storey residential apartment buildings. The findings presented herein establish a foundational

framework for regulatory authorities to comprehend the imperative measures necessary for enforcing policies through regulations and ensuring compliance by building owners and their representatives.

Notably, analogous research is concurrently underway in various other countries, examining fire safety and maintenance practices in high-risk buildings, with implications for sustained community safety (Chan, 2019; Hackitt, 2018; Meacham, 2009, 2016; Rahardjo & Prihanton, 2020). More research into this relatively new assessment methodology of fire safety engineering and performance-based assessment for the design and construction of buildings is required (Australian Building Codes Board, 2021a; Shergold & Weir, 2018; The Centre for International Economics, 2021).

7.5.2 Theoretical Implications

As mentioned in Chapter 1, research does not appear to have considered an extensive understanding of ongoing maintenance and costs (Bukowski & Babrauskas, 1994; Horner et al., 1997; Shergold & Weir, 2018). Only recently have governments in Australia and abroad acknowledged the importance of fire and life safety systems in existing buildings to be maintained and fit for purpose (Duncan, 2005; Hackitt, 2018; New South Wales Government Department of Fair Trading, 2021; NSW Government & Strata Community Association, 2021; Rahardjo & Prihanton, 2020; Victorian Building Authority, 2019, 2021, 2023).

This study expands Ajzen's TPB (Ajzen, 1991) theoretical framework by incorporating building owners and their representatives to predict their behaviour. It has explored the impulsivity and self-regulation capabilities of building owners and their representatives in relation to compliance with policies governing the maintenance of fire and life safety systems in their buildings. This is the first research to demonstrate that applying Ajzen's TPB can yield tangible benefits for community safety by ensuring the maintenance of fire and life safety systems in multi-storey residential apartment buildings throughout their lifespan.

This research is original in being the first to identify statutory maintenance obligations for building owners and their requirement for fire and safety systems to remain functional and fit for purpose throughout a building's lifespan.

The TPB is able to predict behaviour of people and is suited to explore impulsivity and the ability to respond when required for self-regulation (Ajzen, 2005, 2011).

7.6 Conclusion

This chapter has discussed the results of the model, being Ajzen's TPB, and current compliance or otherwise with the policy to maintain multi-storey residential apartment buildings in NSW and Victoria. The results confirm that through Ajzen's TPB, building owners' and their representatives'

attitudes, subjective norms and perceived behavioural control influence their intention to ultimately undertake the critical responsibility of maintaining their buildings' fire and life safety provisions.

The results from councils show that the compliance rate for fire and life safety maintenance requirements were not adequate. This study contradicts previous research conducted by industry and the NSW government regarding compliance of fire and life safety maintenance by owners and strata managers (NSW Government & Strata Community Association, 2021) that indicated a low level of noncompliance. That report, however, was based on mandatory annual fire certificates being submitted and not on detailed checking of the actual buildings to ensure adequate and compliant maintenance was completed.

Overall, it has been established that Australia has a disjointed approach to community safety in a post-construction era for multi-storey residential apartment buildings. Apart from two states – South Australia and to a lesser extent NSW – there are minimal checks and assistance afforded to building owners regarding their statutory requirement to undertake fire and life maintenance on their buildings.

This study comprised eight hypotheses, incorporating enforcement as a moderating factor. Among the hypotheses not involving enforcement, four received support while the remaining two did not. In terms of enforcement as a moderating factor, two hypotheses were supported while four were not. The remaining hypothesis affirmed that the TPB aligns well with this study, including encompassing demographic variables.

Having discussed the results of the measurement and structural model, the next and final chapter will provide the conclusion as well as clear recommendations to ensure that community safety of building occupants is being adequately maintained and compliance with policy through regulation is conducted over the life of buildings.

Chapter 8: Conclusion

8.1 Introduction

This concluding chapter will discuss the research outcomes (section 8.2) and commences with a review of the policy that is the cornerstone of this study, being to maintain multi-storey residential apartment building fire and life safety provisions to ensure ongoing community safety. The study's implications are explored in section 8.3, delving into theoretical considerations (section 8.3.1) that confirm Australia possesses a fragmented approach to building maintenance and fire safety policies for multi-storey residential apartment buildings. Furthermore, the research highlights that limited investigation and research has been completed within the realm of performance-based regulatory policies concerning ongoing fire safety in a post-construction era for high-risk buildings. The chapter then moves on to methodological implications (section 8.3.2) that detail the research methods used and how the research was deployed and analysed using SPSS and SmartPLS4. Following the methodological implications, the next section provides practical implications and recommendations (section 8.3.3) drawn from the results of this study to provide new concepts and ways to improve outcomes for community safety. The next part of this chapter details the limitations of the study (section 8.4) and discusses areas for further research (section 8.5). The chapter then provides concluding remarks and a summary (sections 8.6 and 8.7).

8.2 Outcomes

This study has reviewed the policy of maintaining fire and life safety systems in multi-storey residential apartment buildings in NSW and Victoria in a post-construction environment. It has been confirmed that Australia has a disjointed environment for community safety in a post-construction era for maintaining fire and life safety systems in these high-risk buildings. As each state and territory has the responsibility for administering building policies and regulations, this has resulted in diverse enforcement styles aimed at upholding building and community safety standards (Van der Heijden, 2008). This diversity has produced a disjointed approach to administration and enforcement by regulators that is contributing to reduced community safety for people in the built environment, particularly in multi-storey residential apartment buildings. This is further exacerbated in NSW where third-party assessments and enforcement responsibilities are shared between state government, local government and the private sector, particularly where communication between these statutory authorities to ensure compliance and community safety is not adequate or maintained (Weir, 2023, p. 26). Community safety for residents of these buildings is paramount, and research from this study supports the notion that intervention by authorities, including local government, impacts negatively on

compliance options for property owners. Hence, in order to ensure adherence to the policy aimed at preserving the fire and life safety provisions of buildings, this study has expanded Ajzen's TPB to encompass maintenance responsibilities by building owners concerning the ongoing maintenance of fire and life safety features.

This study has validated the significance of attitudes in influencing the intention to engage in the prescribed behaviour, as evidenced by the data. Building owners exhibit a strong belief in performing the behaviour to maintain the fire and life safety systems of their buildings, a conviction reinforced by subjective norms. Key influencers such as family and friends perceive building owners as having an inherent obligation to carry out the act, a perspective substantiated by supporting evidence. Conversely, the relationship between perceived behavioural control and the intention to undertake the act lacks support. Building owners express a lack of confidence in receiving adequate guidance and support from the various regulatory bodies, casting doubts on their understanding of policies and legislative requirements.

8.3 Implications

This research has contributed to the understanding of and highlighted the importance of community safety for residents living in multi-storey residential apartment buildings in Australia. It has been discussed that from the 2021 census approximately 2.6 million people (2,620,903) or 10.3% of Australia's population now live in apartments, up from the 2016 census of 1,214,372 (Australian Bureau of Statistics, 2021). Notably, these residents are governed by a policy mandating building owners to maintain complex fire and life safety systems, underscoring the utmost importance of community safety.

The following subsections will explore the academic and theoretical implications of this research and conclude with practical recommendations for consideration that were drawn from the results of the study, including from the author's extensive experience across 33 years in a professional capacity undertaking auditing and enforcement on commercial-style buildings.

8.3.1 Theoretical Implications

The incorporation of performance-based building codes in Australia, initiated as recently as 1997, introduced a paradigm shift in the design, approval and construction of buildings. The utilisation of fire safety engineering to quantify and validate compliance with the performance provisions of the Building Code, while justifying design decisions, inadvertently places the onus on building owners to maintain these intricate and tailored fire systems throughout the building's lifespan. Given the recent emergence of fire safety engineering and performance-based building codes on national and international scales, this study represents the first attempt to scrutinise the regulator's role in

administering and enforcing the policy. It delved into the intentions of building owners, entrusted with the responsibility of upkeeping and maintaining their individual multi-storey residential apartment buildings in accordance with the policy.

This research provides new and innovative insights into a building owner's intention and their impulsivity to undertake complex tasks. Through the use of Ajzen's TPB, this study has determined a pathway for both the regulator and building owners to achieve ongoing compliance.

Recent research has also concluded that using Ajzen's TPB is suitable to determine an individual's preparedness for prevention in urban settings in fire scenarios (Kurata et al., 2023) as well as crisis management for accommodation settings in Australia (Wang & Ritchie, 2012).

In the course of this research, it became imperative to gauge the magnitude of the issue and ascertain the precise count of detached apartment complexes exceeding three stories in NSW and Victoria. Regrettably, local government authorities proved unable to furnish this data, and they lacked a comprehensive understanding of the relevance of such information in effectively implementing policies governing fire and life safety systems in post-construction settings for apartment complexes within their jurisdiction. Council staff in NSW and Victoria acknowledged the absence of this data in their databases. Beyond this unidentified issue, the government's dependence on self-regulation, involving private assessments for building design and construction, is characterised by a lack of synchronisation of the policy (Meacham, 2009; Productivity Commission, 2004; Van der Heijden, 2010; Van der Heijden & de Jong, 2009). As most of the research and literature obtained regarding maintenance of fire safety systems is negligible at best, this research will contribute significantly to the understanding of community safety for residents of existing multi-storey residential apartment buildings in Australia. Many regulators lack the ability to review and comprehend the detailed and complex bespoke performance-based designs (Spinardi, 2019) that are being installed in multi-storey buildings. This places greater risk on the community and building occupants where these complex systems have been installed. Given the imperative for continuous maintenance throughout a building's lifespan and the additional responsibility of self-regulation, including reporting obligations, imposed on building owners who may possess limited understanding or knowledge in this domain, the challenges become pronounced. A recent report commissioned by the NSW government in collaboration with the strata community regarding these issues demonstrates a lack of understanding and acknowledgment in this area. This report concluded that 93% of apartment complexes of four or more storeys in NSW were compliant with their annual reporting obligations and self-certification requirements (NSW Government & Strata Community Association, 2021, p. 22). This finding is in stark contrast to the results of the study, through council data that showed an actual compliance rate of only 36% when the buildings were independently inspected and tested.

This research has contributed to the understanding and extent of the problem facing building owners and their representatives on self-certification and reliance on the private sector to maintain complex and bespoke fire and life safety systems in multi-storey residential apartment buildings. Owners' attitudes regarding the policy and reactions were positive and consistent with Ajzen's TPB. Generally, building owners and their representatives agreed that maintenance obligations of owners regarding fire and life safety matters should be undertaken to ensure the safety of all residents in their building; however, they generally didn't feel that they could undertake the task, as they did not fully understand the policy.

Contributing to the existing literature on compliance options for regulators, this study incorporates insights from the Australian Building Codes Board's understanding of their role (Australian Building Codes Board, 2021a) and owners' intentions and expectations through the applied theoretical framework. This additional perspective aims to support regulators in effectively fulfilling their roles in administering policies through regulation.

This study extends Ajzen's Theory of Planned Behaviour (TPB) framework by focusing on building owners and their representatives to predict their compliance behaviour. It examines how impulsivity and self-regulation capabilities influence adherence to policies regarding the maintenance of fire and life safety systems in multi-storey residential apartment buildings. Utilising Ajzen's TPB, this research uniquely demonstrates tangible benefits for maintaining life safety systems in multi-storey residential apartment buildings.

The originality of this research lies in its identification of statutory maintenance obligations for building owners, emphasising the necessity for fire and safety systems to remain functional and fit for purpose throughout a building's lifespan. This is the first study to employ the TPB in this context, highlighting its applicability to real-world safety system maintenance.

8.3.2 Methodological Implications

This research utilised a quantitative methodology employing a two-phase survey approach. The initial phase involved reaching out to local governments in NSW and Victoria to assess actual compliance with the policy. The subsequent phase involved engaging with building owners and their representatives to gauge building owners' intentions, guided by Ajzen's TPB, influencing their behaviour. The study not only established the factual compliance of the policy but also was a first to examine aspects of community safety for residents in multi-storey residential apartment buildings. It specifically focused on the maintenance obligations of fire and life safety systems throughout the lifespan of these buildings by their owners.

The survey encompassed all Victorian councils and selected local government authorities in NSW, yielding data on a total of 36,726 individual apartment buildings. This data aims to ascertain the community safety implications and risks associated with noncompliance with the policy, addressing concerns for both building owners and regulators.

The next stage focused on building owners and their representatives, primarily strata management companies mandated by owners' corporations (owners of apartment buildings), to execute the necessary tasks. This research is the first to expand Ajzen's TPB to determine the attitudes, subjective norms and perceived behavioural control of building owners and their representatives, including the role of enforcement by the regulator, to ascertain their inclination to adhere to self-regulation by undertaking specific behaviours, being the maintenance of fire and life safety provisions in multi-storey residential apartment buildings.

Utilising SPSS, the results underwent verification and a non-response bias test to discern any distinctions between the initial and subsequent responders. Levene's test for equality of variance, as recommended by Armstrong and Overton (1977) and Coakes and Steed (2009), was employed for this assessment. The findings indicated no outliers or discernible differences among responders, encompassing variables such as age, position and education.

Ajzen's theoretical framework was adapted to include a moderating effect regarding enforcement by the regulator. The use of structural equation modeling as detailed in Chapter 5 and the results in Chapter 6 confirmed the analysis, with bootstrapping used to determine the significance of the path model.

8.3.3 Recommendations

The findings of this study have a number of practical recommendations to improve overall community safety in multi-storey residential apartment buildings.

- **Influence of family, friends and peers.** From the results, the influence of family, friends and peers is an important factor to providing a positive influence and was supported. Greater influence for social norms in the community will provide positive effects on building owners and their representatives, including strata managers who manage buildings on behalf of owners' corporations (building owners). Emphasising the significance of fire and life safety in existing multi-storey buildings is crucial within the community, involving efforts from family, friends and the community. This importance aligns with the ongoing program in NSW led by the Building Commissioner, focusing on defect compliance in residential apartment buildings. The potential social repercussions for practitioners, including builders, architects, engineers and building surveyors, can be severe, impacting reputation and long-term career prospects in

the industry (Bleby, 2020a, 2020b; Department of Fair Trading NSW Government, 2020; Kwan, 2023). Through the author's experience in the building surveying profession with the Australian Institute of Building Surveyors, industry acknowledges that it is socially undesirable to be involved with multi-storey residential apartments and that if you are, careful attention is needed to ensure that all facets of approval, compliance and build are correct (Press, 2020). This is the same process that should be considered for strata managers who act on behalf of building owners to maintain these complex fire and life safety systems installed in apartment buildings.

- **Governance contributions.** From the results of the actual compliance rate of residential apartment buildings, only 36% in NSW and 13% in Victoria were found to be compliant. The maintenance technicians who carry out the essential safety maintenance work are required to be trained and registered with state registration authorities (Better Regulation, 2023; New South Wales Government Department of Fair Trading, 2021; Victorian Building Authority, 2021); however, as the results show, only a percentage of buildings comply with the policy. This is despite the accreditation of personnel undertaking the works and demonstrates a lack of knowledge and/or oversight by registration authorities. It is recommended that these maintenance contractors be upskilled and adequately trained, with suitable monitoring by the regulator, to ensure that they are discharging their duties in a professional and compliant manner.

- **Enforcement by the regulator with a focus on education and assistance to comply with the policy.** Although the results of the study did not show a significant relation between intention and behaviour and that this was amplified negatively with a high level of enforcement, many respondents confirmed that they should be afforded with more education and assistance to comply, and not with random inspections. However, despite these results, it is recommended that state-based regulators provide training and assistance to building owners and strata managers regarding their obligations for maintaining the fire and life safety systems in their apartment buildings. This is highlighted when building owners purchasing off-the-plan units in residential apartments are not made aware of the performance solutions installed by developers to save money on construction costs to meet alternative performance requirements and that in turn require additional ongoing maintenance of fire and life safety systems (Shergold & Weir, 2018, p. 10). Some strata managers as part of their response to this study advised that they do not feel confident that the mandated yearly reporting requirements to the regulator are being completed in accordance with the appropriate standards. They conveyed that they feel that some maintenance contractors who provide a certifying service are taking advantage of their lack of awareness and understanding in this

complex area. To further add to the implementation and training of building owners and their representatives, building manuals should be prepared (Shergold & Weir, 2018, p. 35) and be provided and/or made available to all building owners of multi-storey residential apartment buildings. Building manuals, among many other things, detail the building's fire and life safety provisions to be maintained, including the frequency and to what standard this needs to be applied (Australian Building Codes Board, 2021b). This will contribute to helping building owners and their representatives to be made aware of the extent of the fire and life safety provisions that are installed in their buildings.

8.4 Limitations of the Study

Firstly, this study has identified the key criteria for building owners to undertake the behaviour of maintaining their building's fire and life safety provisions; however, the study was limited to NSW and Victoria. While it is acknowledged that each state and territory has their own policy and enforcement through regulation (see Chapter 2 and Appendix A for a national discussion on each policy position), two systems are used nationally. NSW has a mandatory reporting scheme via an annual fire safety statement, and Victoria provides a fully self-regulated approach – thus these jurisdictions were utilised for this study. However, other states' policy positions and requirements should be understood to gain an understating in this technical area.

Secondly, the low number of responders from councils and building owners should be considered, even though the number of buildings that were subject to the policy in NSW and Victoria provided great insight. The low response may have been caused by council officers not wanting to divulge that they did not have the actual number of buildings within their municipality or understood the relevance of Ajzen's TPB to fire and life safety systems. A number of local governments in Victoria and NSW explained that they did not see value in completing this survey, as they did not have the data.

Regarding strata managers in NSW and Victoria, many – including industry associations – advised that they did not want to complete the survey and did not see value, as this was not an issue that they believe would impact them, while others indicated that they had been subject to enforcement by the regulator and were now concerned about fire safety in the buildings that they manage.

8.5 Future Research

Firstly, this research concentrated on multi-storey residential apartment buildings in NSW and Victoria. Additional research may be beneficial for other jurisdictions to determine the effectiveness of their states' schemes, including policy; however, the actual number of buildings would need to be established in order to gain the full extent of the problem. This may be challenging. Local governments in NSW and Victoria could not provide this data, as their data collection processes did not contain this information.

Secondly, conducting longitudinal research on apartment complexes in NSW and Victoria and comparing compliance options through the use of Ajzen's TPB to assess the perspectives of owners over an extended period would be advantageous. Given the intricate nature of maintaining fire and life safety systems in multi-storey residential apartment buildings throughout their lifespan, testing the policy and evaluating the maintenance obligations of building owners over an extended timeframe would provide valuable insights. Maintaining fire and life safety systems in these buildings is the foundation of a safe and reliable fire safety system (Wang et al., 2015, p. 160; Wong & Xie, 2014), in

addition to performance-based building codes using contemporary fire engineering methodologies (Kodur et al., 2020).

Thirdly, researchers may wish to undertake studies on audits of completed multi-storey buildings to ascertain the efficacy and compliance of self-reporting and certification by building owners.

Fourthly, in Australia, there has been a lack of comparisons between existing buildings without self-reporting requirements and new buildings. While some limited research in other countries has addressed the compliance or noncompliance of fire and life safety maintenance systems (Productivity Commission, 2004; Wang et al., 2015), there is a need for researchers to delve into the current compliance pathways and the actual adherence to policy.

Finally, the use of artificial intelligence (AI) regarding the maintenance regimes of building maintenance and management will be a critical factor in future building performance and management. Further research in the field of AI regarding maintenance activities and fire safety will be required to assist building owners and maintenance personnel to maintain the building's fire and safety systems to comply with regulatory requirements (Huang et al., 2022). Although building information modeling (BIM) is currently being used by building professionals, including fire safety engineers, project and construction managers and architects, using AI is being explored for fire safety management (Wang et al., 2015). BIM, however, does not apply to all buildings and therefore future AI requirements could be integrated into the whole of the building's life cycle needs no matter what systems are used.

8.6 Concluding Remarks

It has been established within this thesis that performance-based building codes for the design, approval and construction of buildings, introduced concurrently for the adoption of a privatised building regulatory system for the enforcement and administration of building regulations, places significant emphasis on ensuring community safety within the built environment. Governments have been slow to respond to this paradigm shift. Instead, and emanating from the cladding crisis in Australia that placed a spotlight on the performance of industry to self-regulate, governments have reached out to industry to be part of the solution (Department of Industry Science Energy and Resources, 2019). Although there have been numerous research papers and industry enquiries regarding performance-based building codes and the new field of fire safety engineering, little to no attention has been given to ongoing fire safety in a post-construction environment. It is envisaged that this research will provide the impetus for government regulators, industry and building owners to maintain their fire and life safety systems in a self-regulating environment over the lifespan of buildings.

The results of this research show that more needs to be undertaken to ensure community safety is maintained in our built environment and that a collaborative approach is needed. With the recommendations in this paper, several have been provided in a practical sense, allowing building owners to understand their obligations, including strata managers and technicians who provide post-occupancy certification on fire safety systems.

The recommendations derived from this research emphasise that family, friends and peers play a pivotal role in positively influencing the behaviour under consideration. Stressing the importance of fire and life safety in existing multi-storey buildings is crucial within the community, requiring collaborative efforts from family, friends and the community at large that are consistent with normative beliefs and subjective norms to influence intentions under the theoretical framework. Although enforcement of the regulator was not supported in the results, building owners and strata managers conveyed that more assistance and training is required to assist them to comply; this again is consistent with the control beliefs and perceived behavioural control to influence their intentions. Ultimately the results confirmed that the TPB with attitude to intention regarding behaviour was positively supported.

This study has made a significant contribution by validating the utilisation of Ajzen's theoretical framework to offer fresh and innovative insights into building owners' intentions and their readiness to engage in complex tasks. Ultimately, this understanding influences their behaviour in maintaining the fire and life safety systems of their buildings over the design lifespan.

This study is original in its incorporation of the TPB to investigate individual impulsivity in engaging in specific behaviours, such as actively participating in work tasks and being vigilant in maintaining a building's fire and life safety systems. In contrast to previous research, which predominantly focused on compliance of policy-type behaviours, this study uniquely addresses the aspect of physically carrying out work-related activities.

8.7 Summary

This chapter has provided an overall conclusion to the research of this study, confirmed Ajzen's TPB and validated the findings of the research objectives. The outcomes of the study detailed that Australia has a disjointed and incohesive environment for community safety in a post-construction era for multi-storey residential apartment buildings. The implications of this study were outlined and detailed in the theoretical implications and methodological outcomes.

The study's recommendations offer practical examples for enhancing community safety for building occupants while minimising risks for building owners and governments. These recommendations advocate for regulatory enforcement with a focus on education and assistance. Additionally, they

underscore the necessity of upskilling both strata managers and technicians responsible for maintaining high-risk multi-storey residential apartment buildings. The recommendations further validate the impact of family, friends and peers on the intention and behaviour aligned with Ajzen's theory of planned behaviour.

The limitations were covered and explained, as well as recommendations for future research studies. The chapter then provided the concluding remarks that placed significant emphasis for community safety within the built environment post-occupancy stage.

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Appendices

Appendix A: Australia's State and Territory Fire Safety Maintenance Regulatory Policies

1 Introduction

Buildings are designed and regulated to ensure that they are fit for purpose, facilitate cost-effective construction methods and provide for the maintenance of buildings (*Building Act 1993* (Vic) p. 14). Each state and territory in Australia will have some form of policy regarding the ongoing maintenance of multi-storey residential buildings. This chapter will explore each state and territory jurisdiction regarding the policy to maintain buildings and the implications for building owners for noncompliance with the policy.

2 Australian Building Codes Board

The Australian Building Codes Board was established in 1994 under an intergovernmental agreement signed by all tiers of government to produce, administer and develop the content for the National Construction Code (Australian Building Codes Board, n.d.).

Essentially the NCC is called up in each state's legislative powers through their respective Acts of parliament and subordinate legislation. The NCC is the technical component of the policy, and the administrative function for the policy is administered by each state and territory. The administration of ongoing fire and life safety compliance emanating from the use of performance provisions falls to each state and territory to administer.

3 Victoria

In Victoria, the administration function for the maintenance of ESM is contained within part 15 of the *Building Regulations 2018* (Vic). Part 15 specifies that all buildings having a BCA classification of 1b through to 9 are required to be maintained.

All buildings specified under the policy regardless of age are required to be maintained at predetermined intervals throughout the life of the building. All buildings that have been constructed, altered or extended after 1 July 1994 require either an occupancy permit or certificate of final inspection to be issued with a maintenance determination that specifies the element, frequency and standard to apply for maintaining the ESM. For buildings that were constructed prior to 1 July 1994, ESM are required to be maintained to fulfil their purpose (*Building Regulations 2018* Vic).

It is the responsibility of each local government authority through the municipal building surveyor and/or the chief officer of the relevant fire authority to enforce the maintenance provisions of all relevant buildings.

Buildings that are subject to ESM are divided into three categories depending on when they were constructed, altered or extended. These are:

- buildings built after 1 May 2005
- buildings built between 1 July 1994 and 1 May 2004
- buildings built prior to 1 July 1994.

(*Building Regulations 2018* Vic)

The relevant legislation applicable for the maintenance of fire safety installations is:

- *Building Act 1993* (Vic)
- *Building Regulations 2018* (Vic).

These regulations require the building owner to maintain their essential services for the building throughout the year and are required to self-regulate the ESM policy under part 15 of the *Building Regulations 2018* (Vic). Therefore, building owners are required to complete the appropriate testing mechanisms including maintenance logbooks and complete a yearly self-certification stating that all ESM have been maintained throughout the preceding year. These maintenance checks, logbooks and self-certification must be available for display or viewing by the relevant local government authority through the municipal building surveyor and/or the chief officer of the relevant fire authority.

The fines applied for noncompliance under part 15 of the *Building Regulations 2018* (Vic) are summarised in Table A-1.

Table A-1: Implications for Consumer Noncompliance

Reference	Description of offence	Penalty units
Reg. 216	Owner must comply with maintenance determination.	20
Reg. 218	Relevant building surveyor must prepare or update maintenance schedule for an existing building or place of public entertainment.	10
Reg. 223(1)	Owner must prepare annual essential safety measures report within 28 days before each anniversary of the relevant anniversary date.	20
Reg. 223(2)	Owner must prepare annual essential safety measures report within 28 days before 13 June 2018 and each anniversary of that date for buildings constructed before 1 July 1994.	20
Reg. 225	Records relating to essential safety measures must be made available.	20
Reg. 226	Maintenance responsibility of owner of building or place of public entertainment to ensure ESMs are maintained to fill their purpose.	20
Reg. 227	Essential safety measures not to be removed from approved locations	20
Reg. 228	Maintenance of exits and paths of travel by occupiers of buildings or places of public entertainment.	20

Source: *Building Regulations 2018* (Vic)

There are no mandatory reporting provisions requiring a building owner to submit to any authority that the building's fire safety systems have been maintained for the preceding year.

4 New South Wales

In New South Wales (NSW), fire and life safety systems are referred to essential fire safety measures and are required to be maintained and be fit for purpose. The governing provisions are contained within the *Environment Planning and Assessment Act 1979* (NSW) and the *Environment Planning and Assessment Regulation 2000* (NSW). Specifically, the essential fire safety systems are referenced within Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021 (NSW).

The relevant legislation applicable for the maintenance of fire safety installations is:

- *Environment Planning and Assessment Act 1979* (NSW)
- *Environmental Planning and Assessment Regulation 2021* (NSW)
- *Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021* (NSW)
- *Environment Planning and Assessment Regulation 2000* (NSW)
- *Design and Building Practitioners Act 2020* (NSW).

An annual fire safety statement is required to be completed and submitted by the owner of a building that has a BCA classification of 2 through to 9. It is only buildings that are classified as being a BCA Class 2 to 9 that have been the subject of a building approval or fire safety notice by the local council after 1 July 1988 that are required to comply with the policy (Department of Planning and Environment, 2023). The annual fire safety statement must be provided to the local authority and the NSW Fire & Rescue Service in addition to having it displayed in a prominent position in the building. There appears to be a gap in the provisions for buildings constructed prior to 1 July 1988 that have not been subject to a building approval or a fire safety notice, as there are no annual reporting and compliance requirements.

Recently the NSW government have created a competent fire safety practitioner for two areas; the first is for the design of fire safety systems and the second is for carrying out of maintenance work on fire safety systems (Department of Fair Trading NSW Government, 2023). Only qualified, competent fire safety practitioners are permitted to carry out certain maintenance requirements for the essential fire safety systems. This new requirement also requires that all fire safety statements must be issued by competent fire safety practitioners, thereby requiring building owners when they submit their annual fire safety statements to require it be completed by a competent fire safety practitioner.

The fines applied for noncompliance of essential fire safety measures are contained within the *Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021* (NSW) regarding maintenance and reporting requirements only are summarised in Table A-2.

Table A-2: Implications for Consumer Noncompliance

Clause	Individual Penalty Units	Corporation Penalty Unit
Clause78 Fire safety schedules (2) A person must— (a) issue a schedule (a ***fire safety schedule***)— (i) in the approved form, and (ii) containing the matters specified in section 79, and (b) ensure the requirements of this section relating to the fire safety schedule are complied with.	150	300
Clause 80 Providing fire safety schedules and fire safety certificates after fire safety order is given (2) A person to whom a fire safety order is given in relation to a building must, within the time specified in the order, give a copy of the final fire safety certificate for the building to (a) the person who gave the fire safety order, and (b) if the person who gave the fire safety order was not the council—the council.	300	600
Clause 81 Essential fire safety measures to be maintained (1) The owner of a building must maintain each essential fire safety measure for the building— (a) for an essential fire safety measure specified in a fire safety schedule—to a standard no less than that specified in the schedule, or (b) for an essential fire safety measure applicable to the building but not specified in the fire safety schedule (an ***original measure***)—to a standard no less than that to which the measure was originally designed and implemented.	300	600
Clause 84 Issue of fire safety certificates (1) A person must not issue a fire safety certificate unless the assessments required for the certificate have been carried out within the previous 3 months. (3) The person who carries out an assessment must— (a) inspect and verify the performance of each essential fire safety measure being assessed, and (b) test the operation of equipment relevant to the essential fire safety measure being assessed that— (i) is specified in the current fire safety schedule for the building, and (ii) has not previously been tested in an assessment because it is newly installed.	150	300

Clause	Individual Penalty Units	Corporation Penalty Unit
85 Fire safety certificate to be given to Fire Commissioner and building practitioner and displayed in building		
(1) As soon as practicable after a fire safety certificate is issued for a building, the owner of the building must—		
(a) give a copy of the certificate and a copy of the current fire safety schedule to the Fire Commissioner, and	100	200
(a1) give a copy of the certificate to a building practitioner to whom the owner is required to give notice, under the Design and Building Practitioners Act 2020, section 16, of the owner's intention to apply for an occupation certificate, and required to give notice, under the Design and Building Practitioners Act 2020,		
section 16, of the owner's intention to apply for an occupation certificate, and	150	300
(b) ensure a copy of the certificate and a copy of the current fire safety schedule are prominently displayed in the building.		
86 Information to be included in fire safety certificates	150	300
(1) A person must not issue a fire safety certificate for a building or part of a building unless the certificate—		
(a) is in the approved form, and		
(b) contains the following information—		
(i) the name and address of the owner of the building,		
(ii) a description of the building, including the address,		
(iii) a list of each essential fire safety measure in the building and the minimum standard of performance specified in the relevant fire safety schedule for each measure,		
(iv) the date on which the essential fire safety measures were assessed,		
(v) whether the certificate is a final or interim fire safety certificate,		
(vi) a statement to the effect referred to in section 83(1)(b) for a final fire safety certificate or section 83(2)(b) for an interim fire safety certificate,		
(vii) the date on which the certificate is issued,		
(viii) the full name, business address, telephone number and accreditation number of each accredited practitioner (fire safety) who carried out an assessment under section 84(1).		
(3) A person must not issue a fire safety certificate for a building or part of a building unless the certificate is accompanied by a fire safety schedule for the building or part of the building.		

Clause	Individual Penalty Units	Corporation Penalty Unit
88 Annual fire safety statement (4) The person who carries out the assessment referred to in subsection (1)(a) must inspect and verify the performance of each essential fire safety measure being assessed.	150	300
89 Duties of building owners in relation to annual fire safety statements (1) The owner of a building to which an essential fire safety measure applies must give the council an annual fire safety statement for the building. (4) As soon as practicable after an annual fire safety statement is issued for a building, the owner of the building must— (b) ensure a copy of the statement and a copy of the current fire safety schedule are prominently displayed in the building.	400 55	800
90 Supplementary fire safety statement (4) The person who carries out the assessment must inspect and verify the performance of each fire safety measure being assessed.	150	300
91 Duties of building owners in relation to supplementary fire safety statements (1)If a critical fire safety measure is specified in the fire safety schedule for a building, the owner of the building must ensure the council is given a supplementary fire safety statement for the measure in accordance with this section. (4) As soon as practicable after issuing a supplementary fire safety statement, the owner of the building must— (b) ensure a copy of the statement and a copy of the current fire safety schedule are prominently displayed in the building.	400 55	800 55
92 Information to be included in fire safety statements (1) A person must not issue an annual or supplementary fire safety statement for a building unless the statement— (a) is in the approved form, and (b) contains the following information— (i) the name and address of the owner of the building, (ii) a description of the building, including the address, (iii) for an annual fire safety statement—a list of each essential fire safety measure for the building and the minimum standard of performance for each measure, (iv) for a supplementary fire safety statement—a list of each critical fire safety measure for the building and the minimum standard of performance specified in the relevant fire safety schedule for each measure, (v) the date on which the essential and critical fire safety measures were assessed,	150	300

Clause	Individual Penalty Units	Corporation Penalty Unit
(vi) the date on which the building was inspected, (vii) whether the statement is an annual or supplementary statement, (viii) a statement to the effect referred to in section 88(1) for an annual statement or section 90(1) for a supplementary statement, (ix) the date on which the statement is issued, (x) the name, address and telephone number of the person who issued the statement, (xi) the name, address and telephone number of the accredited practitioner (fire safety) who assessed the fire safety measures for the statement. (2) A person must not issue a fire safety statement for a building unless the statement is accompanied by a fire safety schedule for the building.		

Source*: Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021* (NSW)

5 Queensland

In Queensland, ESM are referred to as fire safety installations and apply to all buildings regardless of age but do not include detached dwellings and non-habitable buildings (*Building Fire Safety Regulations 2008* Qld). The relevant legislation applicable for the maintenance of fire safety installations is:

- *Building Act 1975*
- *Building Fire Safety Regulation 2008*
- *Building Regulation 2006*
- *Fire and Emergency Services Act 1990*
- *Queensland Building Services Authority Act 1991*
- Queensland Development Code (QDC).

The policy for maintaining buildings are detailed in the Queensland Development Code MP6.1 Maintenance of Fire Safety Installations (Queensland Government, 2023). The requirements to conduct maintenance on the fire safety installations is the responsibility of the building owner, if the building owner is the occupier. If the building has a tenant, then it is the tenant's responsibility to maintain. All buildings are required to have their respective fire safety systems maintained and tested with the building by the occupant or owner, and they must lodge a yearly statement to the Queensland Fire Safety and Emergency Services certifying that the building has been maintained to the relevant standards (*Building Fire Safety Regulations* 2008 Qld).

Queensland has further developed an increased safety requirement for higher risk buildings; this is the provision of a Fire Safety Adviser. The Fire Safety Adviser is required to be appointed and trained by the occupiers of buildings deemed to be a high occupancy building as defined in the *Building Fire Safety Regulation 2008*. The buildings that are deemed to be high occupancy are BCA Class 2, 3, 5, 6, 7b, 8, 9a or 9b buildings that have 30 or more people employed, or BCA Class 2 or 3 buildings that have an effective height of more than 25 metres (*Building Fire Safety Regulations 2008 Qld*). The Fire Safety Advisor does not necessarily need to be building specific; however, it is the role of the Fire Safety Advisor to provide first response evacuation instructions and provide or arrange evacuation coordination instructions.

Budget accommodations have additional fire safety provisions that must be maintained. Budget accommodation buildings are buildings that accommodate six or more unrelated persons that have shared access to bathroom facilities, including toilets (*Building Fire Safety Regulations 2008* Qld). These types of buildings are generally backpacker hostels, bed and breakfast establishments and the like.

The penalties for noncompliance of the policy are contained in the *Building Fire Safety Regulations 2008* (Qld). The applicable penalties for noncompliance with the prescribed fire safety installations are summarised in Table A-3.

Table A-3: Implications for Consumer Noncompliance

Reference	Description of Offence	Penalty Units
Reg. 50	A person must carry out maintenance of a prescribed fire safety installation in compliance with QDC part MP6.1	30
Reg. 53	Person must give occupier must give the occupier of the building a notice about the defect in the approved form (a critical defect notice) within 24 hours after the person carries out the maintenance of the installation.	30
Reg. 54(1)	The occupier of a building must ensure that maintenance of each prescribed fire safety installation for the building is carried out by an appropriately qualified person	30
Reg. 54(2)	The occupier of a building must ensure each prescribed fire safety installation for the building is inspected and tested at intervals in compliance with QDC, part MP6.1.	30
Reg. 54(4)	The occupier of the building must ensure the repair is carried out or the corrective action is taken no later than 1 month after the maintenance of the installation was carried out, unless the occupier has a reasonable excuse	30
Reg. 55(1)	The occupier of a building must keep a record of maintenance, in compliance with subsections (2) and (3), for the maintenance of each prescribed fire safety installation for the building.	20
Reg55(A)	The occupier of a building must, at intervals in compliance with QDC, part MP6.1, prepare a statement (an occupier statement) that complies with the part about the maintenance of each prescribed fire safety installation for the building.	20
Reg. 55(2)	The occupier must keep a copy of each occupier statement with the record of maintenance for 2 years after the statement is prepared.	20

Reference	Description of Offence	Penalty Units
Reg. 55(3)	The occupier must, within 10 business days after the occupier is required to prepare an occupier statement, give the commissioner a copy of the statement.	20
Reg. 55B	Applies to occupiers of certain residential-style buildings, e.g. budget accommodation where a fire safety management plan is required and a building used for conducting a residential service for which a fire safety management plan is required. The occupier must keep with eh fire safety management plan of the building, including records of maintenance and occupier statements prepared under sec. 55A of the Act.	20

Source: *Building Fire Safety Regulations 2008* (Qld)

6 Australian Capital Territory

In the Australian Capital Territory (ACT), ESM are referred to as fire protection systems and equipment, and these systems are also known as fire appliances within *the Emergency Act 2004* (ACT). All buildings having a BCA classification of 2 through to 9 regardless of age are required to be maintained and be fit for purpose over their lifespan (*Building (General) Regulation 2008* ACT). The relevant legislation applicable for the maintenance of fire safety installations is:

- *Emergencies Act 2004* (ACT)
- *Building Act 2004* (ACT)
- *Building (General) Regulation 2008* (ACT)
- *Planning and Development Regulation 2008* (ACT).

These provisions are generally administered by the Australian Capital Territory Fire & Rescue through the *Emergencies Act 2004* (ACT). There are no obligations to submit proof of ongoing maintenance of a building's fire protection systems and equipment; however, the relevant chief officer of Fire & Rescue has the ability to undertake inspections, require upgrades to buildings and place limits of occupation of buildings (*Emergencies Act 2004* ACT). This is generally administered under part 5.4 of the *Emergencies Act 2004* (ACT). The occupier of the building is required to ensure that all fire protection systems and equipment are maintained in accordance with a proper maintenance standard. This is required to be completed in accordance with AS1851 or AS/NZS2293.2 or a standard approved as part of the building approval or a standard of maintenance prescribed by regulation.

The penalties for noncompliance of the policy are contained in the *Emergencies Act 2004* (ACT) and are summarised in Table A-4.

Table A-4: Implications for Consumer Noncompliance

Description	Penalty units
The occupier does not maintain the fire appliance in accordance with a proper maintenance standard	50
The occupier of premises commits an offence if: a fire appliance at the premises has been removed, destroyed or damaged or is defective; and the occupier fails to repair or replace the fire appliance.	50

Source: *Emergencies Act 2004* (ACT)

7 South Australia

In South Australia (SA) fire and life safety systems are referred to essential safety provisions and are administered through regulation 100 of the *Planning, Development and Infrastructure (General) Regulations 2017* (SA). The Ministerial Building Standard MBS SA002 provides the performance and deemed-to-satisfy requirements for the installation, maintenance and testing of essential safety provisions installed (Plan SA, n.d.). The Ministerial Building Standard MBS SA002 is referenced through the *Planning, Development and Infrastructure Act 2016* (SA). The relevant legislation applicable for the maintenance of fire safety installations is:

- *Planning, Development and Infrastructure (General) Regulations 2017* (SA)
- Ministerial Building Standard SA002
- *Planning, Development and Infrastructure Act 2016* (SA).

All buildings having a BCA classification of 2 through to 9 are required to be maintained in accordance with the Ministerial Building Standard MBS 002. There are certain exemptions to this policy for buildings that have a BCA classification of 1b or 2 that do not have a rise in storeys exceeding three with a maximum floor area of 2000 sqm, or the building is a BCA Class 3, 4, 5, 6, 7, 8 or 9b that does not have a rise in storeys of two and a maximum floor area exceeding 500 sqm.

The owner of a building must submit annually to the relevant local government authority verification that all applicable essential safety provisions have been tested and maintained through completion of a Form 3 for essential safety provision maintenance verification. This must be completed within 60 days after the end of each calendar year.

The penalty for noncompliance for the owner is a fine of up to $10,000 if the essential safety provisions are not adequately maintained and the annual statement is not submitted to the relevant government authority (*Planning, Development and Infrastructure (General) Regulations 2017* SA).

8 Western Australia

In Western Australia (WA), fire and life safety systems are referred to as safety measures and are administered through part 8, division 2A, regulation 48A of the *Building Regulations 2012* (WA).

Regulation 48A(2) of the *Building Regulations 2012* (WA) specifies that the owner of an existing building must ensure that the safety measures in each part of the building safety systems are capable of performing as intended. Therefore, the maintenance provisions rely on the building owner to maintain their essential safety systems to be fit for purpose (Department of Mines Industry Regulation and Safety, 2017). There are no formal reporting requirements, however a maximum fine of $5000 applies if noncompliance is determined by the relevant authority.

The relevant legislation applicable for the maintenance of fire safety installations is:

- *Building Act 2011* (WA)
- *Building Regulations 2012* (WA)

Occupancy permits are required to specify the maintenance and inspection regimes for safety measures, and all buildings having a BCA classification of 2 through to 9 are subject to this provision. Under section 44(1) of the *Building Act 2011* (WA), occupiers also have a role to ensure that essential safety measures are maintained. This means that occupancy permits issued for buildings must be complied with, and this includes the testing and maintenance of essential safety provisions for the building.

The penalty for noncompliance by the owner is:

- for a first offence, a fine of $50,000
- for a second offence, a fine of $75,000
- for a third or subsequent offence, a fine of $100,000 and imprisonment for 12 months.

(*Building Act 2011* WA)

There are no mandatory reporting provisions requiring a building owner to submit to any authority that the building's fire safety systems have been maintained for the preceding year.

9 Northern Territory

In the Northern Territory (NT), ESM are referred to as fire safety measures and are required to be maintained in certain buildings as specified in schedule 2 of the *Fire and Emergency Regulations 1996* (NT). Specific building code classifications have not been used; however, the use of the building has been used to determine if maintenance of the fire safety measures are required. The buildings use ranges from residential accommodation to public and commercial buildings as classified in Vol. 1 of the BCA.

The legislative provisions that detail and enable the maintenance of buildings are:

- *Building Act 1993* (NT)
- *Building Regulations 1993* (NT)
- *Fire and Emergency Act 1996* (NT)
- *Fire and Emergency Regulations 1996* (NT).

Section 50 of the *Building Act 1993* (NT) specifies that the building regulations provide for the maintenance and safety of existing or proposed buildings. Interestingly, the *Fire and Emergency Act* (NT) and accompanying regulations makes provisions for prescribed buildings to be inspected by the Northern Territory Fire and Rescue Service (n.d). This is to ensure for prescribed buildings that their fire safety measures are being maintained and fit for purpose.

Under the fire and emergency regulations, the owner of a prescribed building is responsible for maintaining the fire safety measures. The owner must prepare and make available for inspection all applicable logbooks, maintenance records and annual condition reports in accordance with Australian Standard AS1851.

There are a range of offences for owners that do not comply with the building fire maintenance provisions under the fire and emergency regulations, and these are summarised in Table A-5.

Table A-5: Implications for Consumer Noncompliance

Reference	Description of offence	Penalty units
Reg. 11(1AA)(1)	Owner must ensure that all persons who work in the building are given instruction on measures for the protection of persons in the building from fire and related emergencies annually.	100
Reg. 11(1AA)(3) & (4)	Owner must keep register of persons whom instructions were given 20 penalty units and owner must provide register for inspection on demand	100
Reg. 11(1AA)(d)	Owner must ensure that a building's fire safety measures including designated fire exits ae not blocked are maintained	100

Source*: Fire and Emergency Regulations 1996* (NT)

10 Tasmania

In Tasmania, fire and life safety systems are referred to as essential building services and are required to be maintained under part 14 of the *Building Act 2016* (Tas). The *Building Act 2016* (Tas) requires all maintenance of the essential building services to be maintained by the responsible owner.

A responsible owner includes a building owner, an occupier of a building that is contractually obliged to maintain essential building services or an owners' corporation formed under the *Strata Titles Act*

1998 (Tas) (*Building Act 2016* Tas). Essential building services apply to all buildings that have a BCA classification of 1b through to a 9 or 10c building.

The responsible owner is required to maintain the building in accordance with the schedule of maintenance approved by a building surveyor when it does not relate to plumbing work. Under regulation 77 of the *Building Regulations 2016* (Tas), the permit authority may also request an owner of a premises to provide copies of the maintenance schedule and evidence that the maintenance has been completed. A fine not exceeding 50 penalty units applies and if the offence is continued, there are further fines of 15 penalty units per day during if the offence continues.

The implications for owners not complying with the maintenance implications under part 14 of the *Building Act 2016* (Tas) are summarised in Table A-6.

Table A-6: Implications for Consumer Noncompliance

Reference	Description of offence	Penalty units
Sec. 205(1) of the Act.	The owner must maintain the essential building services.	100 penalty units or 500 penalty units for a body corporate
Sec. 205(3) of the Act.	A person performing maintenance work must complete in accordance with the Act.	100 penalty units or 500 penalty units for a body corporate.
Sec. 206(1) of the Act.	The responsible owner must ensure a schedule of maintenance is prepared and approved by the relevant permit authority in the case of plumbing work or a building surveyor in any other case.	100 penalty units or 500 penalty units for a body corporate
Sec. 206(2) of the Act.	A permit authority or building surveyor must not approve a schedule of maintenance for a building unless they are satisfied that the schedule of maintenance contains sufficient details for compliance.	100 penalty units or 500 penalty units for a body corporate
Sec. 206(3) of the Act.	A responsible owner must ensure that the schedule of maintenance for the building is reviewed yearly and any changes made are approved by a permit authority or building surveyor.	10 penalty units or 50 penalty units for a body corporate
Sec. 206(4) of the Act.	A responsible owner or occupier must comply with eh most recent schedule for the building that has been approved.	100 penalty units or 500 penalty units for a body corporate
Sec. 206(5) of the Act.	A responsible owner or occupier must keep records and provide those records to an authorised officer or chief officer within the meaning of the *Fire Services Act 1979*.	10 penalty units or 50 penalty units for a body corporate

Source: *Building Act 2016* (Tas)

There is no mandatory requirement to lodge with the appropriate authority any yearly maintenance documents demonstrating compliance with the policy.

11 Conclusion

This appendix has shown that there is inconsistent policy in Australia for fire and life safety systems as a result of performance-based building codes.

Further research is required into this area to ensure that the ongoing safety of building occupants and consumers is protected in these highly complex residential and commercial buildings.

Appendix B: List of Essential Safety Measures

Part 1: Building Fire Integrity

Item	Safety measure
1	Building elements required to satisfy prescribed fire-resistance levels
2	Materials and assemblies required to have fire hazard properties
3	Elements required to be non-combustible, provide fire protection, compartmentation or separation
4	Wall-wetting sprinklers (including doors and windows required in conjunction with wall-wetting sprinklers)
5	Fire doors (including sliding fire doors and their associated warning systems) and associated self-closing, automatic closing and latching mechanisms
6	Fire windows (including windows that are automatic or permanently fixed in the closed position)
7	Fire shutters
8	Solid core doors and associated self-closing, automatic closing and latching mechanisms
9	Fire-protection at service penetrations through elements required to be fire-resisting with respect to integrity or insulation, or to have a resistance to the incipient spread of fire
10	Fire protection associated with construction joints, spaces and the like in and between building elements required to be fire-resisting with respect to integrity and insulation
11	Smoke doors and associated self-closing, automatic closing and latching mechanisms
12	Proscenium walls (including proscenium curtains)

Part 2: Means of Egress

Item	Safety measure
1	Paths of travel to exits
2	Discharge from exits (including paths of travel from open spaces to the public roads to which they are connected)
3	Exits (including fire-isolated stairways and ramps, non fire-isolated stairways and ramps, stair treads, balustrades and handrails associated with exits, and fire-isolated passageways)
4	Smoke lobbies to fire-isolated exits
5	Open access ramps or balconies for fire-isolated exits
6	Doors (other than fire or smoke doors) in a required exit, forming part of a required exit or in a path of travel to a required exit, and associated self-closing, automatic closing and latching mechanisms

Part 3: Signs

Item	Safety measure
1	Exit signs (including direction signs)
2	Signs warning against the use of lifts in the event of fire
3	Warning signs on sliding fire doors and doors to non-required stairways, ramps and escalators
4	Signs, intercommunication systems, or alarm systems on doors of fire-isolated exits stating that re-entry to a storey is available
5	Signs alerting persons that the operation of doors must not be impaired
6	Signs required on doors, in alpine areas, alerting people that they open inwards
7	Fire order notices required in alpine areas

Part 4: Lighting

Item	Safety measure
1	Emergency lighting

Part 5: Firefighting Services and Equipment

Item	Safety measure
1	Fire hydrant system (including on-site pump set and fire-service booster connection)
2	Fire hose reel system
3	Sprinkler system
4	Portable fire extinguishers
5	Fire control centres (or rooms)

Part 6: Air-Handling Systems

Item	Safety measure
1	Smoke hazard management systems (a) automatic air pressurisation systems for fire-isolated exits (b) zone smoke control system (c) automatic smoke exhaust system (d) automatic smoke-and-heat vents (including automatic vents for atriums) (e) air-handling systems that do not form part of a smoke hazard management system and which may unduly contribute to the spread of smoke
	(f) miscellaneous air-handling systems serving more than one fire compartment to which Sections 5 and 6 of AS/NZS 1668.1 The use of ventilation and air conditioning in buildings – Part 1: Fire and smoke control in buildings, as in force or as re-issued or as published from time to time (g) other air-handling systems.
2	Car park mechanical ventilation system
3	Atrium smoke control system (see item 1(d) for smoke and heat vents)

Part 7: Automatic Fire Detection and Alarm Systems

Item	Safety measure
1	Smoke and heat alarm system
2	Smoke and heat detection system
3	Atrium fire detection and alarm system

Part 8: Occupant Warning Systems

Item	Safety measure
1	Sound system and intercom system for emergency purposes
2	Building occupant warning system

Part 9: Lifts

Item	Safety measure
1	Stretcher facilities in lifts
2	Emergency lifts
3	Passenger lift fire service controls

Part 10: Standby Power Supply System

Item	Safety measure
1	Standby power supply system

Part 11: Building Clearance and Fire Appliances

Item	Safety measure
1	Open space around large, isolated buildings
2	Vehicular access around large, isolated buildings

Part 12: Mechanical Ventilation and Hot, Warm and Cooling Water Systems

Item	Safety measure
1	Mechanical ventilation systems incorporating cooling tower systems (other than a system serving only a single sole-occupancy unit in a Class 2 or 3 building or a Class 4 part of a building)
2	Mechanical ventilation systems incorporating hot and warm water systems (other than a system serving only a single sole-occupancy unit in a Class 2 or 3 building or a Class 4 part of a building)

Source: *Building Regulations 2018*

Appendix C: Information to Participants Involved in Research

INFORMATION TO PARTICIPANTS INVOLVED IN RESEARCH

Municipal Council Building Departments

You are invited to participate

You are invited to participate in a research project entitled *'A performance-based building code on statutory maintenance: Exploring the translation of policy to practice for multi-storey residential buildings in Australia'.*

This project is being conducted by a student researcher Stephen Scimonello as part of a Doctor of Philosophy (PhD) degree at Victoria University under the supervision of Professor Annona Armstrong AM from the College of Business, Victoria University.

Project explanation

The purpose of this thesis is to develop a strategy that will promote compliance for building owners and companies including bodies corporate, that own multi-storey residential buildings within a deregulated building regulation for statutory maintenance emanating from a performance-based building code.

This study will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners that are subject to the policy. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

Definitions

Policy – The term 'policy' in this questionnaire refers to the relevant regulations and/or requirement to maintain a building's essential fire safety system over the life of a building. This is known in different states and territories as essential safety measures, safety measures or safety features.

Essential fire safety systems – in this questionnaire means essential safety measure or safety measure or fire safety feature and can be an active or passive system as defined in the ABCB publication titled *Maintenance of Safety Measures, Equipment and Energy Efficiency Installations Handbook*.

Multi-storey residential building – refers to any residential building containing two or more residences (NCC 2019 definition *Sole Occupancy Unit*) with 3 or more storeys in height (NCC 2019 classification Class 2).

What will I be asked to do?

You will be asked a series of questions to determine the number of buildings subject to the policy, the compliance rate of the policy, attitudes, understanding and intentions for ongoing statutory maintenance of multi-storey residential buildings.

What will I gain from participating?

The potential benefits for participants will be the development of a greater understanding for building owners including bodies corporate of the requirement to maintain a building's fire safety system to be fit for purpose to allow the continued occupation of the building. This study will simply be a series of questions to answer using an online survey.

How will the information I give be used?

An online website questionnaire will be used to obtain the data to assess the level of compliance, understanding and intention of the policy by building owners including bodies corporate.

What are the potential risks of participating in this project?

All questionnaires will remain confidential and any data obtained from the online survey to determine the level of compliance of buildings will remain anonymous. Only statistical aggregates of numbers will be used for a given state or territory. This will ensure that all respondents to the questionnaire will be confidential and cannot be traced back to the original source, only the numbers are shown. There are no risks for participants in this study.

How will this project be conducted?

This study will use a mixed-method approach consisting of an online questionnaire and in-depth interviews.

The research will involve collecting primary data from inner-city local governments. The data to be collected will consist of the number of buildings that are subject to the policy, the number of buildings inspected, and the perceived understanding of the policy by regulators and building owners.

An online website questionnaire will be used to obtain the data to assess the level of compliance, understanding and intention of the policy by building owners.

Who is conducting the study?

Victoria University
Ballarat Road
Footscray Victoria 3011

Professor Annona Armstrong AM
College of Business
Victoria University
Tel: 03 9919 6155

Student; Stephen Scimonello
Tel: 0447 216 346

Any queries about your participation in this project may be directed to the Chief Investigator listed above.

If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, e-mail researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Thank you for assisting us with our research.

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

INFORMATION TO PARTICIPANTS INVOLVED IN RESEARCH

You are invited to participate

You are invited to participate in a research project titled *'A performance-based building code on statutory maintenance: Exploring the translation of policy to practice for multi-storey residential buildings in Australia'.*

This project is being conducted by a student researcher Stephen Scimonello as part of a Doctor of Philosophy (PhD) degree at Victoria University under the supervision of Professor Annona Armstrong AM from the College of Business, Victoria University.

Project explanation

The purpose of this thesis is to develop a strategy that will promote compliance for building owners and companies including bodies corporate, that own multi-storey residential buildings within a deregulated building regulation for statutory maintenance emanating from a performance-based building code.

This study will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners that are subject to the policy. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

Definitions

Policy – The term 'policy' in this questionnaire refers to the relevant regulations and/or requirement to maintain a building's essential fire safety system over the life of a building. This is known to be essential safety measures or safety measures or safety features in different states and territories.

Essential fire safety systems – in this questionnaire means essential safety measure or safety measure or fire safety feature and can be an active system, i.e. smoke alarm, emergency lighting or sprinkler system or passive system, i.e. fire rated walls, floors and doors etc.

Multi-storey residential building – refers to any residential building containing two or more residences with 3 or more storeys in height.

What will I be asked to do?

You will be asked a series of questions to determine attitudes, understanding and intentions of building owners regarding the policy for ongoing statutory maintenance of a building's fire safety system.

What will I gain from participating?

The potential benefits for participants will be the development of a greater understanding for building owners including bodies corporate of the requirement to maintain a building's fire safety system to be fit for purpose to allow the continued occupation of the building. This study will simply be a series of questions to answer using an online survey.

How will the information I give be used?

An online website questionnaire will be used to obtain the data to assess the level of compliance, understanding and intention of the policy by building owners including bodies corporate.

What are the potential risks of participating in this project?

All questionnaires will remain confidential and any data obtained from the online survey to determine the level of compliance of buildings will remain anonymous. Only statistical aggregates of numbers will be used for a given state or territory. This will ensure that all respondents to the questionnaire will be confidential and cannot be traced back to the original source, only the numbers are shown. There are no risks for participants in this study.

How will this project be conducted?

This study will use a mixed-method approach consisting of an online questionnaire and in-depth interviews.

The research will involve collecting primary data from inner-city local governments based. The data to be collected will consist of the number of buildings that are subject to the policy, the number of buildings inspected, the number of compliant inspections and the perceived understanding of the policy by building owners.

An online website questionnaire will be used to obtain the data to assess the level of compliance, understanding and intention of the policy by building owners.

Who is conducting the study?

Victoria University
Ballarat Road
Footscray Victoria 3011

Professor Annona Armstrong AM
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Thank you for assisting us with our research.

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

INFORMATION TO PARTICIPANTS INVOLVED IN RESEARCH

ONLINE INTERVIEWS

You are invited to participate

You are invited to participate in a research project titled *'A performance-based building code on statutory maintenance: Exploring the translation of policy to practice for multi-storey residential buildings in Australia'.*

This project is being conducted by a student researcher Stephen Scimonello as part of a Doctor of Philosophy (PhD) degree at Victoria University under the supervision of Professor Annona Armstrong AM from the College of Business, Victoria University.

Project explanation

The purpose of this thesis is to develop a strategy that will promote compliance for building owners and companies including bodies corporate, that own multi-storey residential buildings within a deregulated building regulation for statutory maintenance emanating from a performance-based building code.

This study will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners that are subject to the policy. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

Definitions

Policy – The term 'policy' in this questionnaire refers to the relevant regulations and/or requirement to maintain a building's essential fire safety system over the life of a building. This is known to be essential safety measures or safety measures or safety features in different states and territories.

Essential fire safety systems – in this questionnaire means essential safety measure or safety measure or fire safety feature and can be an active system, i.e. smoke alarm, emergency lighting or sprinkler system or passive system, i.e. fire rated walls, floors and doors etc.

Multi-storey residential building – refers to any residential building containing two or more residences with 3 or more storeys in height.

What will I be asked to do?

You will be asked a series of questions to determine attitudes, understanding and intentions of building owners regarding the policy for ongoing statutory maintenance of a building's fire safety system.

What will I gain from participating?

The potential benefits for participants will be the development of a greater understanding for building owners including bodies corporate of the requirement to maintain a building's fire safety system to be fit for purpose to allow the continued occupation of the building. This study will simply be a series of questions to answer regarding your intentions, attitudes and understanding of the policy for ongoing maintenance of your building.

How will the information I give be used?

An online website questionnaire will be used to obtain the data to assess the level of compliance, understanding and intention of the policy by building owners including bodies corporate.

An online interview will essentially be undertaken to confirm the responses to the online questionnaire.

What are the potential risks of participating in this project?

All questionnaires will remain confidential and any data obtained from the online survey to determine the level of compliance of buildings will remain anonymous. Only statistical aggregates of numbers will be used for a given state or territory. This will ensure that all respondents to the questionnaire will be confidential and cannot be traced back to the original source, only the numbers are shown. There are no risks for participants in this study.

How will this project be conducted?

This study will use a mixed-method approach consisting of an online questionnaire and in-depth interviews.

The research will involve collecting primary data from inner-city local governments based. The data to be collected will consist of the number of buildings that are subject to the policy, the number of buildings inspected, the number of compliant inspections and the perceived understanding of the policy by building owners.

An online website questionnaire will be used to obtain the data to assess the level of compliance, understanding and intention of the policy by building owners.

The online interview will confirm the responses to the online questionnaire and determine attitudes, understanding and intentions of building owners regarding the policy.

Who is conducting the study?

Victoria University
Ballarat Road
Footscray Victoria 3011

Professor Annona Armstrong AM
College of Business
Victoria University
Tel: 03 9919 6155

Student; Stephen Scimonello
Tel: 0447 216 346

Any queries about your participation in this project may be directed to the Chief Investigator listed above.

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Thank you for assisting us with our research.

Appendix D: Online Questionnaire

Local Government Questions

Section A – Background Details

This part of the questionnaire is to obtain information about your processes regarding the statutory essential safety provisions of existing multi-storey residential buildings. Please note, at no stage will your individual name or council be identified or be required in this questionnaire. All responses will be treated strictly confidential.

Definitions

Policy – The term 'policy' in this questionnaire refers to the relevant regulations and/or requirement to maintain a building's essential fire safety system over the life of a building. This is known in different states and territories as essential safety measures, safety measures or safety features.

Essential fire safety systems – in this questionnaire this means essential safety measure or safety measure or fire safety feature and can be an active or passive system as defined in the ABCB publication titled *Maintenance of Safety Measures, Equipment and Energy Efficiency Installations Handbook*.

Multi-storey residential building – refers to any residential building containing two or more residences (NCC 2019 definition *Sole Occupancy Unit)* with 3 or more storeys in height (NCC 2019 classification Class 2).

1. What state in Australia is your local government area located?

Victoria	NSW

2. What is your current position

Position	**Answer**
Council building surveyor	
Buildings maintenance manager	
Council technical officer	
Building engineer	
Other	

3. What is your highest level of education obtained?

Education Level	**Answer**
Below Year 12 secondary college	
Completed Year 12 secondary college	
Diploma or equivalent from a TAFE (VET sector)	
Advanced diploma from a TAFE (VET sector)	
Associate degree	
Undergraduate degree	
Postgraduate diploma	
Master's degree	
Doctoral degree	
Other – please specify	

4. Does your council have a policy (either formal or informal) to manage essential fire safety measures or fire safety systems for multi-storey residential buildings in your municipality?

Yes	**No**

5. How many multi-storey residential buildings do you believe are within your municipal area?

   Answer: _____ No.

6. How many multi-storey residential buildings do you believe are compliant with essential safety measures or fire safety provisions?

   Answer: _____ No.

7. How many essential fire safety systems or fire safety inspections have you completed within the previous 12 months on existing multi-storey residential buildings

   Answer: _____ No.

8. Of those buildings inspected, how many were found to be compliant with their essential services maintenance requirements?

   Answer: _____ No.

9. What is your understanding of the role the regulator has to achieve compliance of the policy?

Response

Section B: The Questionnaire

This part of the questionnaire is to obtain your thoughts and understanding regarding the statutory requirement to maintain essential safety systems within multi-storey residential buildings. Please note, at no stage will your individual name or council be identified or be required in this questionnaire. All responses will be treated strictly confidential.

		Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	About the policy for maintaining essential fire safety systems …	1	2	3	4	5
.1	The policy is a good idea					
.2	It is worthwhile					
.3	It is too complex					
.4	It is too time-consuming					
.5	It is satisfactory					
.6	It works well					
.7	I value the policy					
.8	The policy is essential for a building to remain safe for occupants					
.9	The policy generates confidence, which is vital for industry					
.10	The policy requires the owner to be responsible for the implementation of the policy					
	Comments/Responses					
	Do you think the policy is necessary? Is a good idea? Does it work?					

2	Meeting the policy maintenance requirements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	If not maintained deaths of residents could occur					
.2	By maintaining a building's fire safety system maintains the buildings value					
.3	A professional service is needed to meet maintenance requirements					
.4	A building's owner should be able to maintain a building's fire safety system					
.5	The regulator should provide assistance to comply with the policy					
	Comments/Responses					

3	The expectation is that the regulator will …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	enforce the policy for fire safety maintenance to owners of multi-storey residential building					
.2	provide support to owners to comply with the policy					
.3	provide sufficient information to assist owners to comply with the policy					
.4	be able to do more than the policy requires?					
	Comments/Responses					

4	As the regulator, do you believe that …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	building owners have a very good understanding of the policy					
.2	building owners value the policy					
.3	building owners comply with the policy					
.4	building owners expect you to assist them to meet their obligations to comply with the policy					
.5	building occupants expect you to enforce the policy					
.6	there is social pressure to comply with the policy					
.7	you receive sufficient support from other government agencies to achieve compliance with the policy					
.8	the community expect you to enforce the policy					
.9	your peers expect you to apply and enforce the policy					
.10	you are required to carry out and enforce the policy					
.11	your supervisors and managers expect you to apply and policy					
.13	only qualified personnel should be permitted to maintain a building's fire safety systems					
.14	the policy should be expanded to provide a stronger regulation of maintenance activities					
	Comments/Responses					

5	As the regulator, do you feel it is important to you that the following groups or people expect you to apply and enforce the policy?	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	Your peers					
.2	Your family					
.3	Building occupants					
.4	Building owners					
.5	Your supervisors and managers					
.6	The community					
	Comments/Responses					

Is there anything else that you would like to contribute to this questionnaire regarding the policy to maintain essential fire safety systems in multi-storey residential buildings?

Comments

Thank you for taking the time to complete this survey.

Building Owner Questions

Section A – Background Details

This part of the questionnaire is to obtain information about you. Please note, at no stage will your individual name or building identity be required in this questionnaire. All responses will be treated strictly as confidential.

Definitions

Policy – The term 'policy' in this questionnaire refers to the relevant regulations and/or requirement to maintain a building's essential fire safety system over the life of a building. This is known to be essential safety measures or safety measures or safety features in different states and territories.

Essential fire safety systems – in this questionnaire this means essential safety measure or safety measure or fire safety feature and can be an active system, i.e. smoke alarm, emergency lighting or sprinkler system or passive system, i.e. fire rated walls, floors and doors etc.

Multi-storey residential building – refers to any residential building containing two or more residences with 3 or more storeys in height.

Please tick the box to indicate your answer.

1. What state in Australia do you work in?

Victoria	NSW

2. Please indicate your gender

Gender	**Answer**
Male	
Female	

3. Please indicate your age _____

Age	**Answer**
Under 18	
18 to 24 years	
25 to 34 years	
35 to 44 years	
45 to 54 years	
55 to 64 years	
65 +	

4. Please indicate if you are the building owner or a representative of the building owner, or other.

	Answer
Building owner	
Representative of building owner	
Other	

5. What is your current position?

Position	**Answer**
Building owner	
Facility manager	
Body corporate representative/manager	
Maintenance manager	
Building engineer	
Other	

6. What is you highest level of education obtained?

Education Level	**Answer**
Below Year 12 secondary college	
Completed Year 12 secondary college	
Diploma or equivalent from a TAFE (VET sector)	
Advanced diploma from a TAFE (VET sector)	
Associate degree	
Undergraduate degree	
Postgraduate diploma	
Master's degree	
Doctoral degree	
Other – please specify	

7. How many buildings do you own, manage or represent?

   Answer:_____ No

Note: If you own or manage more than one building, please choose the building that is the largest or has the most residential apartments contained.

8. What is the approximate age of the building?

   Answer: _____ years

9. How many individual residences are in the building?

   Answer: _____ No

10. How many storeys is your building?

    Answer: _____ No

11. Do you know what the policy is for your building's fire safety provisions?

Yes	No

12. If you answered Yes to the above, what do you believe the policy is for your building?

Response

Section B: The Questionnaire

1	About the policy for maintaining essential fire safety systems …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	The policy is a good idea					
.2	It is worthwhile					
.3	It is too complex					
.4	It is too time-consuming					
.5	It is satisfactory					
.6	It works well					
.7	I value the policy					
.8	The policy is essential for a building to remain safe for occupants					
.9	The policy generates confidence, which is vital for industry					
.10	The policy requires the owner to be responsible for the implementation of the policy					
	Comments/Responses					
	Do you think the policy is necessary? A good idea? Does it work?					

2	Meeting the policy maintenance requirements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	If not maintained deaths of residents could occur					
.2	By maintaining a building's fire safety system preserves the buildings value					
.3	A professional service is needed to meet maintenance requirements					
.4	We use an external service					
.5	We use internal expertise					
.6	The regulator should provide assistance to comply with the policy					
.7	Fire safety maintenance in my building was completed in the last 12 months					
	Comments/Responses					

3	Regarding the policy, do you believe that …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	providing a building that is compliant with the policy is most important					
.2	my lifestyle will improve knowing that the building is compliant with the policy					
.3	my lifestyle will not change if I do not provide a building that is compliant with the policy					
.4	my personal and legal liability will be reduced if I comply with the policy					
.5	maintaining all the building's fire safety provisions is easy					

4	Regarding the policy, do you believe that …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	you receive sufficient support from stakeholders including government departments, regulators and agencies					
.2	you have been made aware of the requirement to maintain your building's fire safety systems by the regulatory authority					
.3	you have been made aware of the consequences if you do not maintain your building's fire safety systems by the regulatory authority					
.4	there is great social pressure from the community to comply with the policy					
.5	there will be social consequences if you don't comply with the policy					
.6	most other people I know who are important to me believe that I should maintain the building's essential fire safety systems					
.7	other building owners I know carry out all essential fire safety maintenance on their buildings					
.8	most other people I know whose opinions I value would approve of me carrying out essential fire safety measures					

5	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building?	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	Members of your family					
.2	Co-workers					
.3	Friends					
.4	Peers					
.5	Regulators and government agencies					
.6	Building occupants					
.7	Others (please specify)					

6	Do you care if the following people or groups expect you to carry out all of the fire safety maintenance on your building?	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	Members of your family					
.2	Co-workers					
.3	Friends					
.4	Peers					
.5	Regulators and government agencies					
.6	Building occupants					
.7	Others (please specify)					

7	I expect that the regulator will …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	enforce the policy for fire safety maintenance to owners of multi-storey residential building					
.2	provide support to owners to comply with the policy					
.3	provide me with sufficient information to assist me to maintain my building's fire safety systems and thereby comply with the policy					
	Comments/Responses					

8	I am confident that I can …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	take responsibility to manage all of the fire safety maintenance provisions on my building.					
.2	carry out all of the essential fire safety maintenance on my building over the next 12 months					
.3	comply with the policy					

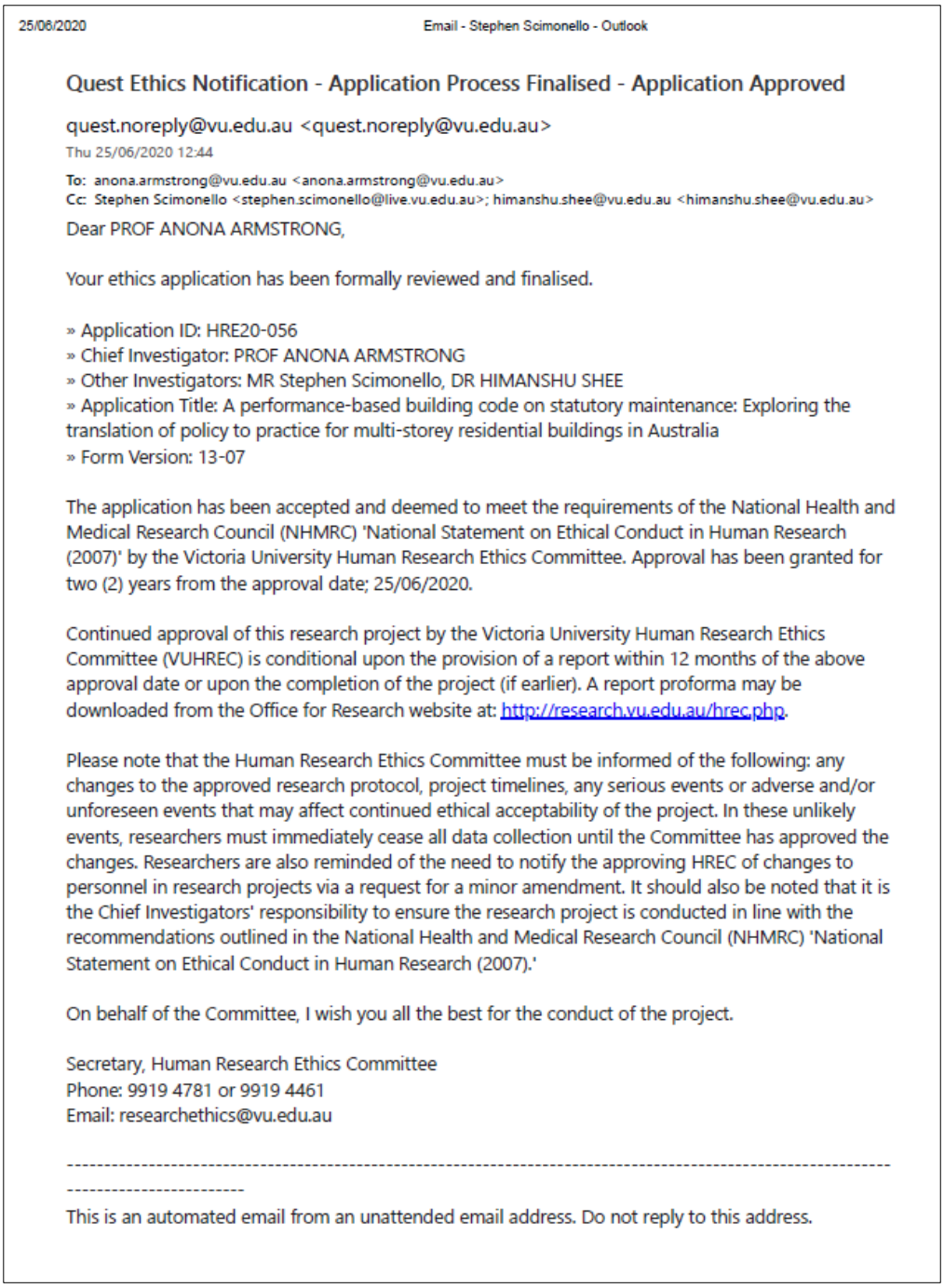
9	I will be encouraged to complete all of the essential fire safety maintenance provisions if I …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	receive support from the regulator					
.2	receive reminder notifications from the regulator					
.3	am provided with specialised training					
.4	am provided with a reward for providing a compliant building					
.5	am provided with immunity in the event of a building emergency such as a fire					
.6	receive praise by the building occupants					
.7	am satisfied that I am doing the right thing					
.8	Other (please specify)					

10	I will be discouraged to complete all the essential fire safety maintenance provisions if …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
		1	2	3	4	5
.1	I get audited by the regulator					
.2	I get fined by the regulator					
.3	I am punished in a court of law					
.4	my peers are not complying with the policy					
.5	it is too difficult to complete all the fire safety maintenance provisions					
.6	it is too time-consuming to complete all the fire safety maintenance provisions					
.7	other building owners are not complying with the policy					

Is there anything else that you would like to contribute to this questionnaire regarding the policy to maintain essential fire safety systems in multi-storey residential buildings?

Comments

Appendix E: Ethics Approval



25/06/2020 Email - Stephen Scimonello - Outlook

Quest Ethics Notification - Application Process Finalised - Application Approved

quest.noreply@vu.edu.au <quest.noreply@vu.edu.au>
Thu 25/06/2020 12:44

To: anona.armstrong@vu.edu.au <anona.armstrong@vu.edu.au>
Cc: Stephen Scimonello <stephen.scimonello@live.vu.edu.au>; himanshu.shee@vu.edu.au <himanshu.shee@vu.edu.au>

Dear PROF ANONA ARMSTRONG,

Your ethics application has been formally reviewed and finalised.

» Application ID: HRE20-056
» Chief Investigator: PROF ANONA ARMSTRONG
» Other Investigators: MR Stephen Scimonello, DR HIMANSHU SHEE
» Application Title: A performance-based building code on statutory maintenance: Exploring the translation of policy to practice for multi-storey residential buildings in Australia
» Form Version: 13-07

The application has been accepted and deemed to meet the requirements of the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007)' by the Victoria University Human Research Ethics Committee. Approval has been granted for two (2) years from the approval date; 25/06/2020.

Continued approval of this research project by the Victoria University Human Research Ethics Committee (VUHREC) is conditional upon the provision of a report within 12 months of the above approval date or upon the completion of the project (if earlier). A report proforma may be downloaded from the Office for Research website at: http://research.vu.edu.au/hrec.php.

Please note that the Human Research Ethics Committee must be informed of the following: any changes to the approved research protocol, project timelines, any serious events or adverse and/or unforeseen events that may affect continued ethical acceptability of the project. In these unlikely events, researchers must immediately cease all data collection until the Committee has approved the changes. Researchers are also reminded of the need to notify the approving HREC of changes to personnel in research projects via a request for a minor amendment. It should also be noted that it is the Chief Investigators' responsibility to ensure the research project is conducted in line with the recommendations outlined in the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007).'

On behalf of the Committee, I wish you all the best for the conduct of the project.

Secretary, Human Research Ethics Committee
Phone: 9919 4781 or 9919 4461
Email: researchethics@vu.edu.au

This is an automated email from an unattended email address. Do not reply to this address.

Appendix F: Survey Distribution Details

Appendix F.1: Victorian Council Building Department Survey Distribution

1st request sent 14 December 2021 to all Victorian council building departments

From: Victorian Municipal Building Surveyors Group Inc. <email@vmbsg.com.au>
Sent: Tuesday, December 14, 2021 1:49 PM
Subject: ESM Survey

Dear Members,

Please find enclosed a link to a survey on Essential Safety Measures for multi-storey residential buildings in this instance BCA Class 2 buildings of 3 or more storeys. This is being conducted by Stephen Scimonello as part of his PhD.

This survey is part of a larger study that will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

Attached is an information sheet that further explains this research. Please feel free to contact Stephen Scimonello on 0447 216 346 or stephen.scimonello@gmail.com if you have any questions or require further information.

Link to the surveyor: https://vuau.qualtrics.com/jfe/form/SV_2s4w0kbTFdAtlSl

Chris Crowe
for
Victorian Municipal Building Surveyors Group Inc.
Building Safety Through Integrity, Professionalism & Advocacy
PO Box 4011
Ringwood 3134
M 0425 292 688
Email: email@vmbsg.com.au
Website: http://www.vmbsg.com.au

2nd request sent 8 March 2022 to all Victorian council building departments

From: Victorian Municipal Building Surveyors Group Inc. <email@vmbsg.com.au>
Sent: Tuesday, March 8, 2022 11:39 AM
Subject: ESM Survey

Good morning members,

Please find enclosed a link to a survey on Essential Safety Measures for multi-storey residential buildings in this instance BCA Class 2 buildings of 3 or more storeys.

This survey is part of a larger study that will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

Attached is an information sheet that further explains this research. Please feel free to contact Stephen Scimonello on 0447 216 346 or stephen.scimonello@gmail.com if you have any questions or require further information.

Link to the survey: https://vuau.qualtrics.com/jfe/form/SV_2s4w0kbTFdAtlSl

Chris Crowe
for
Victorian Municipal Building Surveyors Group Inc.
Building Safety Through Integrity, Professionalism & Advocacy
PO Box 4011
Ringwood 3134
M 0425 292 688
Email: email@vmbsg.com.au
Website: http://www.vmbsg.com.au

Appendix F.2: NSW Council Survey Distribution

ExternalDataReference (Council)	1st Request	2nd Request	3rd Request	Notes
Bayside Council	3/04/2022			Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
Blacktown City Council	3/04/2022	29/05/2022	8/08/2022	Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
Burwood Council	3/04/2022	29/05/2022	8/08/2022	e-mail Request sent 3 April 2022
Byron Shire Council	3/04/2022			e-mail request sent on 3 April 2022 Building Surveyors Department
Campbelltown City Council	3/04/2022			e-mail request sent on 3 April 2022 Essential Fire Safety Measure department
Canterbury Bankstown Council	3/04/2022	29/05/2022	8/08/2022	Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
Central Coast Council	3/04/2022			Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
City of Canada Bay Council	3/04/2022	29/05/2022	8/08/2022	Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
Coffs Harbour City Council	3/04/2022			e-mail Request sent 3 April 2022
City of Parramatta	3/04/2022	29/05/2022	8/08/2022	Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
City of Ryde	3/04/2022	29/05/2022	8/08/2022	e-mail request sent 3 April 2022 Att: Lorelle, Building Department
City of Sydney	3/04/2022	29/05/2022		e-mail Request sent 3 April 2022
Cumberland Council	3/04/2022	29/05/2022	8/08/2022	e-mail request sent 3 April 2022. T
Fairfield City Council	3/04/2022			e-mail request sent 3 April 2022
Inner West Council	3/04/2022	29/05/2022		Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
Ku-ring-gai Council	3/04/2022	29/05/2022	8/08/2022	Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
Lane Cove Municipal Council	3/04/2022	29/05/2022	8/08/2022	e-mail request sent 3 April 2022 Neil Lynch - Building Surveying Dept.
Liverpool City Council	3/04/2022	29/05/2022	8/08/2022	e-mail request sent 3 April 2022 Carli - Certification Unit
Mid-Coast Council	3/04/2022	29/05/2022	8/08/2022	Generic e-mail request sent 3 April 2022 Att: Building Department / Fire Safety Officer
Mosman Municipal Council	3/04/2022			e-mail request sent 3 April 2022 Manager Development Services
North Sydney Council	29/05/2022		8/08/2022	Generic e-mail: council@northsydney.nsw.gov.au
Northern Beaches Council	29/05/2022		8/08/2022	Generic e-mail: council@northernbeaches.nsw.gov.au Att: Regulatory Compliance
Port Macquarie-Hastings Council	29/05/2022		8/08/2022	Generic e-mail: council@pmhc.nsw.gov.au Att: Regulatory Compliance Team.
Port Stephens Council	29/05/2022			Generic e-mail: council@portstephens.nsw.gov.au
Randwick City Council	3/04/2022			e-mail sent 3 April 2022 Manager – Health & Building
Shellharbour City Council	29/05/2022		8/08/2022	Generic Council email address: council@shellharbour.nsw.gov.au att: Building Team
Shoalhaven City Council	3/04/2022			e-mail request sent 3 April 2022 Manager - Certification & Compliance
Strathfield Municipal Council	29/05/2022		8/08/2022	Generic e-mail list Fire Safety Officer sent off
Sutherland Shire Council	29/05/2022			Generic e-mail list Fire Safety Officer sent off
The Council of the Municipality of Hunters Hill	8/08/2022			
The Council of the Shire of Hornsby	8/08/2022			
The Hills Shire Council	8/08/2022			
Wagga Wagga City Council	8/08/2022			
Waverley Council	3/04/2022			e-mail sent 3 April 2022 Fire Safety Officer
Willoughby City Council	8/08/2022			
Wollongong City Council	3/04/2022	29/05/2022		e-mail Request sent 3 April 2022
Woollahra Municipal Council	3/04/2022	29/05/2022	8/08/2022	e-mail request sent 3 April 2022 Fire Safety Officer.

Note: Individual names and contact details have been removed.

Copy of e-mail request to NSW councils

From: stephen scimonello <stephen.scimonello@gmail.com>

Date: Sun, Apr 3, 2022 at 4:55 PM

Subject: Request for Assistance on Essential Fire Safety Measures for Multi-Storey Residential Buildings in NSW

To: <Individual Councils>

Att: Building Department / Fire Safety Officer

City of Parramatta

I am employed by the Australian Institute of Building Surveyors, as the Professional Development Manager. The reason for this e-mail is that I am currently undertaking research through a PhD on the implications of a performance-based building code on statutory maintenance (Fire Safety) for multi-storey residential apartment buildings in Victoria and NSW.

This research will build on the existing policy framework of Ajzen (1991) to capture the intentions and beliefs of building owners to determine and influence their future behaviour with respect to maintaining a building's Essential Fire Safety Measures. Exploring the governance and enforcement mechanisms through local governments, including owner attitudes, will assist to support this research to determine improved compliance mechanisms including motivation of building owners and strata managers to comply.

I have a short questionnaire that I would kindly ask you or another representative at Council to complete. The questionnaire should only take approximately 5 to 10 minutes to complete and will ask a series of questions relating to the ongoing maintenance requirements of Essential Fire Safety Systems in multi-storey residential apartment buildings (BCA Class 2 buildings of 3 or more storeys). All results and responses are strictly confidential, and no individual council will be identified.

A comparison of the Victorian System vs the NSW legislative system will be analysed with the end result to assist building owners, owners' corporations and strata managers to better understand the legislation and promote compliance within the industry. This survey is part of a larger study that will explore socio-technical barriers to comply with statutory maintenance objectives for building owners that are subjected to Essential Fire Safety Measures. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

The survey link is: https://vuau.qualtrics.com/jfe/form/SV_2s4w0kbTFdAtlSl

I have attached an information sheet and please feel free to call me direct on 0447 216 346 or e-mail stephen.scimonello@gmail.com or my supervisor Professor Annona Armstrong AM from the College of Business, Victoria University, Tel: 03 9919 6155.

Kind regards

Stephen Scimonello, PhD Candidate

Building Surveyor

Appendix F.3a: Victorian Strata Management Distribution List

PrimaryEmail	ExternalDataReference (Council)	1st Request	2nd Request	3rd Request	4th Request	Embedded	EmbeddedData8
roslyn.xerxes@strata.community	Victorian Strata Association	29/03/2022	29/05/2022	3/06/2022		Victoria	Sent e-mail and spoke to Roslyn on 29 March. Follow up on 29 May
michael.mccann@strata.community	NSW Strata Association	24/03/2022				NSW	Referred me to OCN being Owners Corporation Network of Australia
enquiries@ocn.org.au	Owners Corporation Network of Australia Ltd	29/05/2022	3/06/2022			NSW	Owners Corporation Network of Australia Ltd Level 4, 95 Pitt Street Sydney NSW 2000
joy@southgippslandownerscorporate.com	South Gippsland Owners Corporate	18/07/2022				Victoria	Call Joy to complete survey
susan@hollyandwilliams.com.au	Holly + William Property	15/07/2022				Victoria	Call Susan to complete survey
bcs_melbourne@bcsm.com.au	Body Corporate Services Melbourne these are the same details	19/07/2022	8/08/2022	22/08/2022		Victoria	Melbourne Office Level 14, 575 Bourke Street Melbourne VIC 3000
bcs_hawthorn@bcsm.com.au	BCS Body Corporate Services these are the same details	19/07/2022				Victoria	Hawthorn Office
info@stratapln.com.au	Strata Plan	19/07/2022	8/08/2022			Victoria	Level 13/222 Kings Way, South Melbourne
stephen.ryder@bluestoneocm.com.au	Bluestone Owners Corporation Management	19/07/2022				Victoria	Level 3, 312 St Kilda Road Melbourne VIC 3004 - https://www.bluestoneocm.com.au/contact/
info@stratamanagementvic.com.au	Strata Management Victoria					Victoria	Waterman Business Centre, Suite 11 / Level 2, 66 Victor Crescent, Narre Warren VIC 3805
ringwood@acebodycorp.com.au	Ace Body Corporate Management (Ringwood)					Victoria	50 Kalinda Road, Ringwood, Victoria 3134, Australia - https://branchlocator.acebodycorp.com.au/state/vic/ringwood
rena.selvaloran@acebodycorp.com.au	Ace Body Corporate Management (Croydon & Dandenong)					Victoria	64 Little John Road, WARRANWOOD, Victoria 3134, Australia - https://branchlocator.acebodycorp.com.au/state/vic/croydon
frontdesk@anderson-assoc.com.au	Anderson & Associates					Victoria	Suite 102, 17 Heatherdale Road Ringwood VIC - https://www.anderson-assoc.com.au/owners-corporation/
alan@alliancecm.com.au	Alliance Owners Corporation Management - Alan Ling					Victoria	Po Box 28, Mitcham, Victoria 3132, Australia
enquiries@kstrata.com.au	KS Strata Management, Victoria					Victoria	37 Nurlendi Rd , VERMONT, Victoria 3133, Australia
admin@ubcm.com.au	Urban Body Corporate Management	19/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Suite 4 / 317 - 321 Whitehorse Road, NUNAWADING, Victoria 3131 - https://ubcm.com.au/contact-us/
info@networkpacific.com.au	Network Pacific Strata Management	19/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	5/303 Burwood Highway, BURWOOD EAST, Victoria 3151, Australia - https://www.networkpacificstratamanagement.com.au/vic/contact/
admin@excelstrata.com.au	Excel Strata Managers	19/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Level 27, 101 Collins Street MELBOURNE VIC 3000 - https://www.excelstrata.com.au/
info@positiveocm.com.au	Positive Owners Corporation Management					Victoria	Suite 19, 39 Grand Boulevard, Montmorency Victoria 3094, Australia - https://positiveocm.com.au/strata-services/
info@propertyownerscorporation.com.au	Property owners corporation services	19/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	PO Box 233, DONCASTER, Victoria 3108, Australia - http://propertyownerscorporation.com.au/
ashini.fernando@longview.com.au	Longview OwnersCorporation P/L	19/07/2022	8/08/2022			Victoria	31 Hardner Rd, Mount Waverley VIC 3149 - https://longview.com.au/contact-us/
info@mbcmfrankston.com.au	MBCM Strata Specialists Frankston	22/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	4 Silkwood Rise, CARRUM DOWNS - https://mbcm.com.au/frankston
poorvi@acebodycorp.com.au	ACE Body Corporate Management Port Melbourne					Victoria	P.O. Box 5583 Mordialloc VIC 3195 - https://branchlocator.acebodycorp.com.au/state/vic/port-melbourne/
info@emty.com.au	228 Toorak Road, SOUTH YARRA, Victoria 3141, Australia	22/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	247 Toorak Road South Yarra - https://www.emitystrata.com.au/contact
ian@sentinalservices.com.au	Sentinel Strata Services P/L	22/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	47 Bourke St , Level 2, MELBOURNE, Victoria 3000, Australia
info@mayfieldocm.com.au	Mayfield Body Corporate Management P/L	22/07/2022	8/08/2022	22/08/2022		Victoria	370 St Kilda Road , Level, Suite 114, MELBOURNE, Victoria 3004, Australia
bcs_hawthorn@bcsm.com.au	Body Corporate Services (BCS), Hawthorn					Victoria	Ground floor, 30 Camberwell Road, MELBOURNE, Victoria 3000, Australia
chris.s@unitedbodycorp.com.au	United Body Corporate Management	22/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	204-206 Johnston St, Suite 7, Collingwood, Victoria 3066, Australia - https://unitedbodycorp.com.au/
Nathan@Allianceocm.com.au	Alliance Owners Corporation Management - Nathan Nankin	22/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	35 Filbert Street, CAULFIELD SOUTH, Victoria 3162
info@tbccollective.com.au	The Body Corporate Collective	22/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Suite 1, 99 Drummond Street CARLTON VIC 3053 - https://bodycorporatecollective.com.au/contact/
melbournecbd@acebodycorp.com.au	Ace Body Corporate Management Melbourne CBD					Victoria	305/366 St Kilda Rd, Melbourne VIC 3000 - https://branchlocator.acebodycorp.com.au/state/vic/melbourne-cbd
info@mbcmcamberwell.com.au	MBCM Strata Specialists Camberwell					Victoria	PO Box 108, CANTERBURY, Victoria 3126, Australia - https://mbcm.com.au/camberwell
mail@centurionstrata.com.au	Centurion Strata Management					Victoria	Legalment Suite 2/ 30-32 Ellingworth Parade Box Hill 3128 - https://centurionstrata.com.au/contact-us/
reception@stratascore.com.au	Strata Score P/L	22/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	960 Whitehorse Road Box Hill VIC 3128 - http://stratascore.com.au/contact/
info.docklands@whittles.com.au	Whittles Australia Pty Ltd	22/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Suite 125, Level 1, 838 Collins Street Docklands VIC 3008 - https://whittles.com.au/branches/docklands/
reception@enginepropertygroup.com.au	Engine Owners Corporation Management Pty Ltd	22/07/2022		22/08/2022	1/09/2022	Victoria	Level 2, 126 Wellington Parade East Melbourne VIC 3002 - https://www.enginepropertygroup.com.au/
joanne@stratease.com.au	StrataEase	22/07/2022	8/08/2022			Victoria	19 Canterbury Street, Moonee Ponds VIC 3039 - https://www.stratsease.com.au/contact/
theknight@theknight.com.au	The Knight					Victoria	Level 2, 2 Glenferrie Road, MALVERN, Victoria 3144, Australia - https://www.theknight.com.au/contact-us/
info@mbcmdandenong.com.au	MBCM Strata Specialists Dandenong					Victoria	DANDENONG, Victoria 3175, Australia - https://mbcm.com.au/dandenong
admin@stratagized.com.au	Stratagized Concepts Group	15/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Lvl 35, 600 Bourke St. Melbourne VIC 3000 - https://www.stratagized.com.au/
info@proficientstratacorp.com.au	Proficient Strata Corp					Victoria	Level 2, Suite 208/370 St Kilda Road Melbourne VIC 3004 - https://www.proficientstratacorp.com.au/contact-us/
info@kingstonmanagement.com.au	Kingston Management Group Pty Ltd	15/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	PO Box 23082, Docklands VIC 8012 Australia - https://kingstonmanagement.com.au/contact/
frankston@acebodycorp.com.au	Ace Body Corporate Management (Frankston)	Centrel No Do not send again				Victoria	PO Box 1123 Hartwell Vic 3124 - https://branchlocator.acebodycorp.com.au/state/vic/frankston
fwithwarchitect@outlook.com	Private Building Owner	18/07/2022				Victoria	Building / Apartment Owner
yangchen.l@acebodycorp.com.au	Ace Body Corporate Management (Collingwood)	18/07/2022				Victoria	P.O. Box 6083 Collingwood North Vic 3066 - https://branchlocator.acebodycorp.com.au/state/vic/south-yarra
enquiries@aocm.com.au	Australian Owners Corporation Management			22/08/2022		Victoria	Suite 443/1 Queens Road, MELBOURNE, Victoria 3004 - http://aocm.com.au/
ross@strataminders.com.au	Strata Minders Pty Ltd	18/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	PO BOX 7078 , HAWTHORN, Victoria 3122, Australia - https://strataminders.com.au/
randjolh.morrison@beyondstrata.com.au	Beyond Strata	18/07/2022				Victoria	Level 7, 575 Bourke Street, MELBOURNE, Victoria 3000 - https://www.beyondstrata.com.au/
admin@excelstrata.com.au	Excel Strata Managers	18/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Suite 12, 14 Albert Street, BLACKBURN - https://www.excelstrata.com.au/portfolio/
info@oscacapital.com.au	Osca Capital Pty Ltd	18/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	PO Box 161 Brunswick, BRUNSWICK - https://oscacapital.com.au/contact/
jocelyn@oc1.com.au	OC One Pty Ltd	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Office 939, 1 Queens Rd , MELBOURNE, Victoria 3004, Australia
Do Not Call Again, this is not applicable.		25/07/2022				Victoria	Do Not Call Again, this is not applicable, they are a real estate agency only.
admin@ocvmgroup.com.au	OCVM Group	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Suite 208, 23-25 Gipps Street Collingwood, Victoria 3066 - https://www.ocvmgroup.com.au/
reception@enginepropertygroup.com.au	Engine Property Group Two of the same Email Addresses	25/07/2022	8/08/2022	22/08/2022		Victoria	Suite 201, 126 Wellington Parade, EAST MELBOURNE - https://www.enginepropertygroup.com.au/contact-us
info@fawknermay.com.au	Fawkner May Pty Ltd					Victoria	Level 5, 171 Collins Street Melbourne - http://www.fawknermay.com.au/index.php/contact/
admin@locgroup.com.au	LOC Strata Management P/L	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Level 1 / 9-12 Hood Street, Collingwood, Victoria 3066, Australia
hello@stratapoint.com.au	StrataPoint	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	https://stratapoint.com.au/contact-us/
	L R Reed (City) Pty Ltd	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Level 1, 405 Collins Street , MELBOURNE
admin@bradyocs.com.au	Brady Owners Corporation Service	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Ground Floor, 270 King St, MELBOURNE, Victoria
contacts@scmanagers.com.au	Strata Community Managers P/L	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Level 1, 333 Drummond Street, CARLTON - http://www.scmanagers.com.au/contact
reception@goughpartners.com.au	Gough Partners Pty Ltd	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Level 1 261 High Street , ASHBURTON
admin@melcorpstrata.com.au	Melcorp Strata	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	477 Swanston Street, MELBOURNE
admin@pscm.com.au	Platinum Strata Community Management P/L	25/07/2022	8/08/2022	call after 16 August		Victoria	PO Box 23266 , DOCKLANDS, Victoria
info@procorpaustralia.com.au	Procorp Australia P/L	25/07/2022	8/08/2022	22/08/2022	1/09/2022	Victoria	Suite 605, 530 Little Collins Street, MELBOURNE,
contact@strataguardian.com	Strata Guardian Note: Tim Reilly good to assist. He has referred m	18/08/2022					Ground Floor 25 Palmerston Crescent, SOUTH MELBOURNE
ashini.fernando@longview.com.au	Longview	18/08/2022					31 Hardner Road, MOUNT WAVERLEY, Victoria
info@essentialcommunity.com.au	Essential Community Management P/L	18/08/2022	1/09/2022				Level 2 / 58 Lorimer St, PORT MELBOURNE
nicole@coleson.com.au	Coleson Owners Corporation	18/08/2022	1/09/2022				PO Box 5081 Kew VIC 3101

Appendix F.3b: NSW Strata Management Distribution List

PrimaryEmail	ExternalDataReference (Council)	1st Request	2nd Request	3rd Request	4th Request	EmbeddedData8
michael.mccann@strata.community	NSW Strata Association	24/03/2022				Sent e-mail respponse was that they are unable to assist.
admin@alcorpstrata.com.au	Alcorp Strata Management	15/08/2022	1/09/2022			1010 Forest Rd, Lugarno NSW 2210
info@allsydneystrata.com.au	All Sydney Strata	15/08/2022	1/09/2022			Shop 1, 339 Woodville Rd, Guilford NSW 2161
admin@akstrata.com.au	A&K Strata Management	15/08/2022	1/09/2022			
info@absolutestrata.com.au	Absolute Strata Management					
strata@activestrata.com.au	Active Strata Management	15/08/2022	1/09/2022			3/8-20 Queen Street, Revesby NSW
info@acumenstrata.com.au	Acumen Strata Management	15/08/2022	1/09/2022			Suite 2 & 3, 42 Refinery Drive, Pyrmont
admin@strataedge.com.au	strataedge					498-502 Parramatta Road, Petersham NSW 2049
accounts@alidiscox.com.au	Allds & Cox (Coogee)	15/08/2022	1/09/2022			61a - 65 Frenchmans Road Randwick
admin@alliancestrata.com.au	Alliance Strata Group	15/08/2022	1/09/2022			PO Box 260, Forster
sarah@ascendcorpstrata.com.au	AscendCorp Strata	15/08/2022	1/09/2022			100 Walker Street North Sydney, NSW
admin@baystrata.com.au	Bay Strata	15/08/2022	1/09/2022			426 Princes Highway, Rockdale NSW 2216
angus.mcdonald@beaumontstrata.com.a	Beaumont Strata Management	15/08/2022	1/09/2022			PO Box 7601, Norwest BC
craig@bridgestrata.com.au	Bridge Strata Community Management	19/08/2022	1/09/2022			Level 1, 20C Monaro Street QBYN
scott@cfstrata.com	CF Strata Management	19/08/2022	1/09/2022			
joe@cfstrata.com	CF Strata Management	19/08/2022	1/09/2022			
info@centralstrata.com.au	Central Strata	19/08/2022	1/09/2022			
johnm@cdstrata.com.au	Chris Darby Strata	19/08/2022				Level 1, 55 Kembla Street, WOLLONGONG
enquiries@civium.com.au	Civium Property Group					
clisdells@clisdells.com.au or brett.rainsley	Clisdells Strata Management	25/08/2022	1/09/2022			624 Princes Highway, Rockdale NSW
info@coastalstrata.com.au	Coastal Strata Inspections					Suite 11/39 Market Street, Wollongong
info@contistrata.com.au	Conti Strata	25/08/2022	5/09/2022			
strata@countrywidelegal.com.au	Countrywide Strata Management	25/08/2022				2 Barton Lane, NORTH TAMWORTH
yamba@curtisstrata.com.au	Curtis Strata	25/08/2022				3/13 Treelands Dr, Yamba, 2464, NSW, Australia
admin@daltonstrata.com.au	Dalton Strata Services	25/08/2022	29/08/2022			Level 3, 1 Buckingham St Surry Hills
reception@goodsell.com.au	DM Goodsell Real Estate	25/08/2022	5/09/2022			191 West Street Umina Beach
lisa@easternstarstrata.com.au	Eastern Star Strata Management	29/08/2022				397 Lyons Road, Five Dock
admin@elingstrata.com.au	Eling Strata Management	29/08/2022				20 Dale Street, Brookvale
reception@elitestrata.com.au	Elite Strata & Property Services	29/08/2022				Suite 1E, 1-10 Amy Close North Wyong
exclusivlystrata@iinet.net.au	Exclusively Strata	29/08/2022				
	Ace Body Corporate Management (Albury)					PO Box 707, ALBURY, New South Wales
	Ace Body Corporate Management (Balmain)	27/07/2022				PO Box 191, BALMAIN, New South Wales 2041
	Ace Body Corporate Management (Baulkham Hills)					PO BOX 1424, BAULKHAM HILLS
	Ace Body Corporate Management (Brookvale)	27/07/2022				83 Reynolds Street, Shop 127, BALMAIN, New South Wales
admin.fairfield@acebodycorp.com.au	Ace Body Corporate Management (Canley Heights)	27/07/2022	8/08/2022	22/08/2022	5/09/2022	127/85 Reynolds Stree, BALMAIN
rebecca.m@acebodycorp.com.au	Ace Body Corporate Management (Coffs Harbour)	27/07/2022	8/08/2022	22/08/2022	5/09/2022	PO Box 432, COFFS HARBOUR, New South Wales 2450, Australia
andrew.isler@acebodycorp.com.au	Ace Body Corporate Management (Ryde)	27/07/2022	8/08/2022	22/08/2022		Po Box 265, RYDE, New South Wales 1680, Australia
	Ace Body Management (Penrith)					
info@acmstrata.com.au	Advanced Community Management Pty Ltd	27/07/2022	8/08/2022	22/08/2022	5/09/2022	PO Box 297, BONDI JUNCTION, New South Wales 1355, Australia
info@assm.net.au	All Suburbs Strata Management Pty Ltd	27/07/2022	8/08/2022	22/08/2022	5/09/2022	PO Box 142, LIVERPOOL, New South Wales 1871, Australia
enquiries@picagroup.com.au	Body Corporate Services (BCS) Chatswood	27/07/2022	8/08/2022	22/08/2022		Suite 13.01, Level 13, 12 Help Street, CHATSWOOD
	Body Corporate Services (BCS), Epping					Level 2, 51 Rawson Street, HAYMARKET
	Body Corporate Services (BCS), Sydney					Level 27, 66-68 Goulburn Street, HAYMARKET
customercare@bright-duggan.com.au, co	Bright & Duggan Pty Ltd	27/07/2022	8/08/2022	22/08/2022	5/09/2022	Level 1, 37-43 Alexander Street , CROWS NEST
reception@cfstrata.com	C F Strata Management	27/07/2022	8/08/2022	Declined to Participate		PO Box 636, KINGSFORD, New South Wales
peter@changestrata.com.au	Change Strata Management	27/07/2022	8/08/2022	22/08/2022	5/09/2022	GPO Box 3822, SYDNEY, New South Wales 2001, Australia
	Chapman Strata					PO Box 259 , NEWCASTLE, New South Wales 2300, Australia
	Cityhome Strata Management					383-385 Church Street, Suite 7, PARRAMATTA, New South Wales 2150, Australia
	Combined Strata					3 South Parade , AUBURN, New South Wales 2144, Australia
admin@cere.com.au	Coyle Everett	28/07/2022	8/08/2022	22/08/2022		58 Hall Street, BONDI BEACH, New South Wales 2026, Australia
	Dubbo Strata Management					PO Box 1584, DUBBO, New South Wales 2830, Australia
enquiries@dynamicproperty.com.au	Dynamic Property Services Pty Ltd	28/07/2022	8/08/2022	22/08/2022	5/09/2022	Level 25, 66-68 Goulburn Street, SYDNEY, New South Wales 2000, Australia
info@elitestrata.net.au	Elite Strata	28/07/2022	8/08/2022	22/08/2022	5/09/2022	Retail 1, 54-56 Macquarie Street North, LIVERPOOL, New South Wales 2170, Austr
janet@firstcommunity.com.au	First Community Management	28/07/2022				Suite 6, 190 George Street, PARRAMATTA, New South Wales 2150, Australia
info@gkstrata.com.au fire@gkstrata.com	GK Strata Management Pty Ltd	28/07/2022	8/08/2022	22/08/2022	5/09/2022	Level 27, 66-68 Goulburn Street, HAYMARKET, New South Wales 2000, Australia
natalie.f@genesistrata.com.au	Genesis Strata Management	28/07/2022	8/08/2022			Suite 2, Level 14, 528 Kent Street, SYDNEY, New South Wales 2000, Australia
info@getstrata.com.au	Get Strata	28/07/2022	8/08/2022	22/08/2022	5/09/2022	1 Allen Street, CANTERBURY, New South Wales 2193, Australia
	iStrata Management Services Pty Ltd					PO Box 607, RANDWICK, New South Wales 2031, Australia
admin@illawarra.com.au	Illawarra Strata Management	29/07/2022	8/08/2022	22/08/2022	5/09/2022	PO Box 1209, WOLLONGONG, New South Wales 2500, Australia
reception@johnhill.com.au	John Hill & Co (Strata)	29/07/2022	8/08/2022	22/08/2022	5/09/2022	PO BOX 1007, BURWOOD, New South Wales 2134, Australia
428georgereception@ajpll.com	Jones Lang LaSalle Management Pty Ltd	29/07/2022				PO Box 317, NORTH SYDNEY, New South Wales 2059, Australia
hello@lamacgwalters.com.au	Lamb & Walters	29/07/2022	8/08/2022	22/08/2022	5/09/2022	PO BOX 95, GORDON, New South Wales 2072, Australia
	McCormacks Strata Management Pty Ltd					Suite 3.01, Level 3, 151 Castlereagh Street, SYDNEY
info@stratachoice.com.au	Strata Choice - CBD Same As Parramatta Office e-r	29/07/2022	8/08/2022	22/08/2022		Suite 206, 68 York Street, SYDNEY, New South Wales 2000, Australia
admin@thestratalife.com.au	Strata Life Hornsby	29/07/2022	8/08/2022	22/08/2022		Suite 3, 143 Peats Ferry Road, HORNSBY, New South Wales 2077, Australia
info@strataplus.com.au	Strata Plus Newcastle Same As Other e-mails	29/07/2022	22/08/2022			123 Scott Street, A1, NEWCASTLE, New South Wales 2300, Australia
info@stratarepublic.com.au	Strata Republic	4/08/2022	22/08/2022	5/09/2022		Suite 704, Level 7, 70 Pitt Street, SYDNEY, New South Wales 2000, Australia
reception@stratatitle.com.au	Strata Title Management - Northern Sydney	4/08/2022	22/08/2022	5/09/2022		Level 4, 1 Chandos Street St, ST LEONARDS, New South Wales 2065, Australia
info@strataopt.com.au	Strataopt Pty Ltd	4/08/2022	22/08/2022	5/09/2022		P.O Box A7, SYDNEY SOUTH, New South Wales 1235, Australia
compliance@sydstrata.com.au	Sydney Strata Specialists	4/08/2022	22/08/2022	5/09/2022		Po Box 7421, BONDI BEACH, New South Wales 2026, Australia
info@thestratacollective.com.au	The Strata Collective Pty Limited	8/08/2022	22/08/2022	5/09/2022		Level 3, 3 Spring Street, SYDNEY, New South Wales 2000, Australia
administrator@masonbrophy.com.au	Mason & Brophy Strata Management Pty Ltd	5/08/2022	22/08/2022	5/09/2022		PO Box 367, DEE WHY, New South Wales 2099, Australia
strata@montanostrata.com.au	Montano Strata Management Services Pty Ltd	5/08/2022	22/08/2022			135 Marion Street, LEICHHARDT, New South Wales 2040, Australia
	New South Wales Strata Management Pty Ltd	Do Not Call				Suite 2.02, Level 2, 21 Solent Circuit, BAULKHAM HILLS
	O'Connors Strata	Do Not Call				Level 1, 24 Ross Street, PARRAMATTA, New South Wales 2150, Australia
Reception@oneillstrata.com	O'Neill Strata Management Pty Ltd	8/08/2022	22/08/2022	5/09/2022		PO Box 887 , BONDI JUNCTION, New South Wales 1355, Australia
admin@precisionstrata.com.au	Precision Strata	8/08/2022	22/08/2022	5/09/2022		PO Box 200, GLEBE, New South Wales 2037, Australia
mail@premierstrata.com.au	Premier Strata Management Pty Ltd	8/08/2022	22/08/2022	5/09/2022		PO Box 3030, PARRAMATTA, New South Wales 2124, Australia
manager@prostrata.com.au	Progressive Strata Services Pty Ltd	8/08/2022	22/08/2022			Suite 206, Level 2, 332 Oxford Street, BONDI JUNCTION
info@realstrata.com.au	Real Strata	8/08/2022	22/08/2022	5/09/2022		Suite 12 895 Pacific Highway , PYMBLE, New South Wales 2073, Australia
reception@smstrata.com.au	SMS Coffs Harbour Pty Ltd	8/08/2022	22/08/2022	5/09/2022		PO Box 1223, COFFS HARBOUR, New South Wales 2450, Australia
admin@smsstrata.com.au	SMS Strata	8/08/2022	22/08/2022	5/09/2022		PO Box 2692 , NORTH PARRAMATTA, New South Wales 1750, Australia
info@stsm.com.au	Stanton and Taylor Strata Management	8/08/2022	22/08/2022	5/09/2022		PO Box 5, PENRITH, New South Wales 2751, Australia
info@stratachoice.com.au	Strata Choice - Parramatta	8/08/2022	5/09/2022			Suite 2.02, 126 Church Street, PARRAMATTA, New South Wales 2150, Australia
info@strataplus.com.au	Strata Plus Parramatta	10/08/2022				370-376 Church Street, Suite 2, PARRAMATTA,
	Strata Plus Tweed Byron	as Parramatta				22 Bay Street, TWEED HEADS,
	Strata Title Management - Tweed Heads					Suite 1, 69 Wharf Street, TWEED HEADS, New South Wales 2485, Australia
nicole@stratаunited.com.au	Strata United	10/08/2022	22/08/2022	5/09/2022		Level 1, 31a Fennell Street, PARRAMATTA, New South Wales 2150, Australia
info@stratamark.com.au	Stratamark Pty Ltd	10/08/2022	22/08/2022	5/09/2022		503/282-290 Oxford Street, BONDI JUNCTION, New South Wales 2022, Australia
info@stratawide.com.au	Stratawide Management Pty Ltd	10/08/2022	22/08/2022	5/09/2022		PO Box Q 89 , QUEEN VICTORIA BUILDING, New South Wales 1230, Australia
compliance@supremestrata.com.au	Supreme Strata	10/08/2022	22/08/2022	5/09/2022		Suite 5, Level 1, 1-17 Elsie Street, BURWOOD, New South Wales 2134, Australia
info@tcmstratacoastal.com.au	TCM Strata Coastal Pty Ltd	10/08/2022	22/08/2022	5/09/2022		SuitE 258, 368-42 Pearl Street, KINGSCLIFF, New South Wales 2487, Australia
info@victorystrata.com.au	Victory Strata Management Pty Ltd	11/08/2022	22/08/2022	5/09/2022		Suite 606, North Tower, 1 – 5 Railway Street , CHATSWOOD
hello@vitalstrata.com.au	Vital Strata Management	11/08/2022				39 Hume Street, CROWS NEST, New South Wales 2057, Australia
amelia.tian@newey.com.au	W.T. Newey & Co	11/08/2022	22/08/2022	5/09/2022		PO Box 184, BANKSTOWN, New South Wales 1885, Australia
reception@stratatitle.com.au	Whittles NSW	11/08/2022				Suite 4, 39-45 Norton Street, LEICHHARDT, New South Wales 2040, Australia
info@wollongong-strata.com.au	Wollongong Strata Pty Ltd	11/08/2022	22/08/2022	5/09/2022		75 Forestview Way, WOLLONGONG, New South Wales 2520, Australia

Appendix F.4: Copy of E-mail Requests Sent to Strata Management Companies

Initial request

From: stephen scimonello <stephen.scimonello@gmail.com>

Date: Fri, Jul 15, 2022 at 4:25 PM

Subject: Request for Research Assistance on Statutory Maintenance Provisions for Multi-Storey Residential Buildings in Victoria

To: <admin@stratagised.com.au>

Cc: Anona Armstrong <anona.armstrong@vu.edu.au>

Hello [name withheld] and thanks for taking my call today.

As discussed, I am undertaking research through a PhD on the implications of a fully performance-based Building Code on statutory maintenance (Fire Safety) for multi-storey residential apartment buildings in Victoria and NSW.

This research will build on the existing policy framework of Ajzen (1991) to capture the intentions and beliefs of building owners to determine and influence their future behaviour with respect to maintaining a building's Fire Safety Measures.

As briefly discussed, I am a Building Surveyor located in Victoria and have completed many fire safety maintenance inspections on high-rise residential apartment buildings in Melbourne. I have observed over this time an increasing complexity of fire safety systems being installed in those buildings to satisfy the performance provisions of the Building Code of Australia. These fire safety systems require specialised technical personnel to maintain them over the life of the building that is placing a heavy financial burden on building owners, owners' corporations and strata management.

The purpose of this research is to develop a strategy that will promote compliance for building owners and owners' corporations including strata managers, that own or manage multi-storey residential apartment buildings within a deregulated building regulatory environment emanating from a performance-based building code. This study will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners that are subjected to the policy. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

I have a short questionnaire that I would kindly ask you or another representative at your company to complete; it should only take approximately 5 to 10 minutes. The questionnaire will ask a series of questions relating to the ongoing maintenance requirements of Essential Fire Safety Systems in multi-storey residential apartment buildings (BCA Class 2 buildings of 3 or more storeys). All results and responses are strictly confidential, and no individual, owners' corporation, strata manager or addresses will be identified. I am just after the data. A copy of the core results of this survey will be provided to you if you wish. A comparison of the Victorian System vs the NSW legislative system will be analysed with the end result to assist building owners and owners' corporations to better understand the legislation and promote compliance within the industry.

The survey link is: https://vuau.qualtrics.com/jfe/form/SV_4ITDWtmSCoNEamF

I have attached an information sheet and please feel free to call me direct on 0447 216 346 or e-mail stephen.scimonello@gmail.com or my supervisor Professor Annona Armstrong AM from the College of Business, Victoria University, Tel: 03 9919 6155

Kind regards

Stephen Scimonello, PhD Candidate

Following and subsequent requests

From: stephen scimonello <stephen.scimonello@gmail.com>

Date: Mon, Aug 8, 2022 at 11:25 AM

Subject: Re: Request for Research Assistance on Statutory Maintenance Provisions for Multi-Storey Residential Buildings in Victoria

To: <admin@stratagised.com.au>

Cc: Anona Armstrong <anona.armstrong@vu.edu.au>

Hello (name withheld), I am just following up on the below e-mail and would be very appreciative if you could again forward this request to your strata manager or other applicable personnel in your organisation.

This research will assist to provide the evidence to the regulators and government that further support is required to allow strata managers and owners to comply with onerous fire safety maintenance requirements for residential apartment buildings. All results and responses are strictly confidential, and no individual, owners' corporation, strata manager or addresses will be identified.

The survey link is: https://vuau.qualtrics.com/jfe/form/SV_4ITDWtmSCoNEamF

I have attached an information sheet and please feel free to call me direct on 0447 216 346 or e-mail stephen.scimonello@gmail.com or my supervisor Professor Annona Armstrong AM from the College of Business, Victoria University, Tel: 03 9919 6155

Kind regards

Stephen Scimonello, PhD Candidate

Appendix F.5: Copy of E-mail Request Sent to Owners Corporation Network of Australia

From: stephen scimonello <stephen.scimonello@gmail.com>

Date: Fri, Jun 3, 2022 at 4:17 PM

Subject: Request for Research Assistance on Statutory Maintenance Provisions for Multi-Storey Residential Buildings in Victoria

To: <enquiries@ocn.org.au>

Cc: Anona Armstrong <anona.armstrong@vu.edu.au>

Hello Owners Corporation Network of Australia

I am just following up on a message request I submitted on your website last week, as I have been unable to get through on your main phone line.

I am undertaking research through a PhD on the implications of a fully performance-based Building Code on statutory maintenance (Fire Safety) for multi-storey residential apartment buildings in Victoria and NSW.

This research will build on the existing policy framework of Ajzen (1991) to capture the intentions and beliefs of building owners to determine and influence their future behaviour with respect to maintaining a building's fire safety measures.

I am a Building Surveyor located in Victoria and have completed many fire safety maintenance inspections on high-rise residential buildings in Melbourne and have observed over this time an increasing complexity of fire safety systems being installed in those buildings to satisfy the performance provisions of the Building Code of Australia. These fire safety systems require specialised technical personnel to maintain them over the life of the building that is placing a heavy financial burden on building owners, owners' corporations and strata management.

The purpose of this research is to develop a strategy that will promote compliance for building owners and owners' corporations including strata managers, that own or manage multi-storey residential apartment buildings within a deregulated building regulatory environment emanating from a performance-based building code. This study will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners that are subjected to the policy. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

I have a short questionnaire that I would like to distribute to your members that will ask them a series of questions relating to the ongoing maintenance requirements of fire safety systems in multi-storey residential apartment buildings (BCA Class 2 buildings 3 or more storeys). I would like to kindly ask if your organisation could forward a survey link with an accompanied information sheet, or alternatively, provide e-mail addresses. All results and responses are strictly confidential and no individual, owners' corporation, strata managers or addresses will be identified. I am just after the data. A copy of the core results of this survey will be provided to you to distribute to your members if you wish. The survey will take approximately 5 to 10 minutes to complete, depending on the detail of answers the respondent wishes to provide. A comparison of the Victorian System vs the NSW legislative system will be analysed with the end result to assist building owners and owners' corporations to better understand the legislation and promote compliance within the industry.

The survey link is: https://vuau.qualtrics.com/jfe/form/SV_4ITDWtmSCoNEamF

I have attached an information sheet and please feel free to call me direct on 0447 216 346 or e-mail stephen.scimonello@gmail.com or my supervisor Professor Annona Armstrong AM from the College of Business, Victoria University, Tel: 03 9919 6155

Kind regards

Stephen Scimonello, PhD Candidate

Response from Owners Corporation Network of Australia

From: Enquiries <enquiries@ocn.org.au>

Date: Wed, Jun 8, 2022 at 11:15 AM

Subject: RE: Request for Research Assistance on Statutory Maintenance Provisions for Multi-Storey Residential Buildings in Victoria

To: stephen scimonello <stephen.scimonello@gmail.com>

Cc: Anona Armstrong <anona.armstrong@vu.edu.au>

Hi Stephen,

Thanks for your patience on this one.

We reviewed the survey and the value our membership may be able to add to your research, in addition balancing it with the lengthy and complex nature of the questions. A majority of our apartment owner and strata committee members would find it difficult to answer many questions without previous engagement in the NSW Fire Safety compliance requirement with their Building Manager or Strata Manager who would generally lead the trades review, repairs and certification works.

We feel that to send it to our members would push many members over the survey fatigue line for our association, with little likely value added to your research quality and a lot of confused and possibly irate member enquiries as the questionnaire seems best suited to the Strata Manager or Building Management level.

Sorry we are unable to assist you in your request, but we wish you the best for your PhD progress. It is an important and contentious area.

P.S. I did complete the survey personally as I have had the unfortunate pleasure of having to assist in managing fire orders in my own building.

Kind regards,

JORGE FERNANDEZ

Business Operations Manager

ocn.org.au

Appendix F.6: Copy of E-mail Request Sent to Strata Associations in NSW and Victoria

Copy of NSW Strata Association request

From: **stephen** scimonello <stephen.scimonello@gmail.com>

Date: Tue, Mar 29, 2022 at 2:55 PM

Subject: Request for Research Assistance on Statutory Maintenance Provisions for Multi-Storey Residential Buildings in Victoria

To: <roslyn.zervos@strata.community>

Cc: Anona Armstrong <anona.armstrong@vu.edu.au>

Hello Roslyn and thank you for taking my call today.

As discussed, I am undertaking research through a PhD on the implications of a fully performance-based Building Code on statutory maintenance (Fire Safety) for multi-storey residential apartment buildings in Victoria and NSW.

This research will build on the existing policy framework of Ajzen (1991) to capture the intentions and beliefs of building owners to determine and influence their future behaviour with respect to maintaining a building's fire safety measures.

As briefly discussed, I am a Building Surveyor located in Victoria and have completed many fire safety maintenance inspections on high-rise residential buildings in Melbourne. I have observed over this time an increasing complexity of fire safety systems being installed in those buildings to satisfy the performance provisions of the Building Code of Australia. These fire safety systems require specialised technical personnel to maintain them over the life of the building that is placing a heavy financial burden on building owners, owners' corporations and strata management.

The purpose of this research is to develop a strategy that will promote compliance for building owners and owners' corporations including strata managers, that own or manage multi-storey residential apartment buildings within a deregulated building regulatory environment emanating from a performance-based building code. This study will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners that are subjected to the policy. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

I have a short questionnaire that I would like to distribute to your members that will ask them a series of questions relating to the ongoing maintenance requirements of fire safety systems in multi-storey residential apartment buildings (BCA Class 2 buildings 3 or more storeys). I would like to kindly ask if your organisation could forward a survey link with an accompanied information sheet, or alternatively, provide e-mail addresses. All results and responses are strictly confidential and no individual, owners' corporation, strata managers or addresses will be identified. I am just after the data. A copy of the core results of this survey will be provided to you to distribute to your members if you wish. The survey will take approximately 5 to 10 minutes to complete, depending on the detail of answers the respondent wishes to provide. A comparison of the Victorian System vs the NSW legislative system will be analysed with the end result to assist building owners and owners' corporations to better understand the legislation and promote compliance within the industry.

The survey link is: https://vuau.qualtrics.com/jfe/form/SV_4ITDWtmSCoNEamF

I have attached an information sheet and please feel free to call me direct on 0447 216 346 or e-mail stephen.scimonello@gmail.com or my supervisor Professor Annona Armstrong AM from the College of Business, Victoria University, Tel: 03 9919 6155

Kind regards

Stephen Scimonello, PhD Candidate

Copy of Victorian Strata Association Request

From: stephen scimonello <stephen.scimonello@gmail.com>

Date: Thu, Mar 24, 2022 at 12:40 PM

Subject: Request for Research Assistance on Statutory Maintenance Provisions for Multi-Storey Residential Buildings in NSW

To: <michael.mccann@strata.community>

Cc: Anona Armstrong <anona.armstrong@vu.edu.au>

Hello Michael and thank you for taking my call last Friday. As discussed, I am undertaking research through a PhD on the implications of a fully performance-based Building Code on statutory maintenance (Fire Safety) for multi-storey residential apartment buildings in Victoria and NSW.

This research will build on the existing policy framework of Ajzen (1991) to capture the intentions and beliefs of building owners to determine and influence their future behaviour with respect to maintaining a building's fire safety measures.

As briefly discussed, I am a Building Surveyor located in Victoria and have completed many fire safety maintenance inspections on high-rise residential buildings in Melbourne. I have observed over this time an increasing complexity of fire safety systems being installed in those buildings to satisfy the performance provisions of the Building Code of Australia. These fire safety systems require specialised technical personnel to maintain them over the life of the building, which is placing a heavy financial burden on building owners and bodies corporate.

The purpose of this research is to develop a strategy that will promote compliance for building owners and companies including bodies corporate, that own or manage multi-storey residential apartment buildings within a deregulated building regulatory environment emanating from a performance-based building code. This study will explore socio-technical barriers to compliance with statutory maintenance objectives for building owners that are subjected to the policy. The adoption of the policy, its implementation in regulation and the outcomes for stakeholders will be investigated.

I have a short questionnaire that I would like to distribute to your members that will ask them a series of questions relating to the ongoing maintenance requirements of fire safety systems in multi-storey residential apartment buildings (BCA Class 2 buildings 3 or more storeys). I would like to kindly ask if your organisation could forward a survey link with an accompanied information sheet, or alternatively, provide e-mail addresses. All results and responses are strictly confidential and no individual, body corporate or building owner or address will be identified. I am just after the data. A copy of the core results of this survey will be provided to you to distribute to your members if you wish. The survey will take approximately 5 to 10 minutes to complete, depending on the detail of answers the respondent wishes to provide. A comparison of the Victorian System vs the NSW legislative system will be analysed with the end result to assist building owners and owners' corporations to better understand the legislation and promote compliance within the industry.

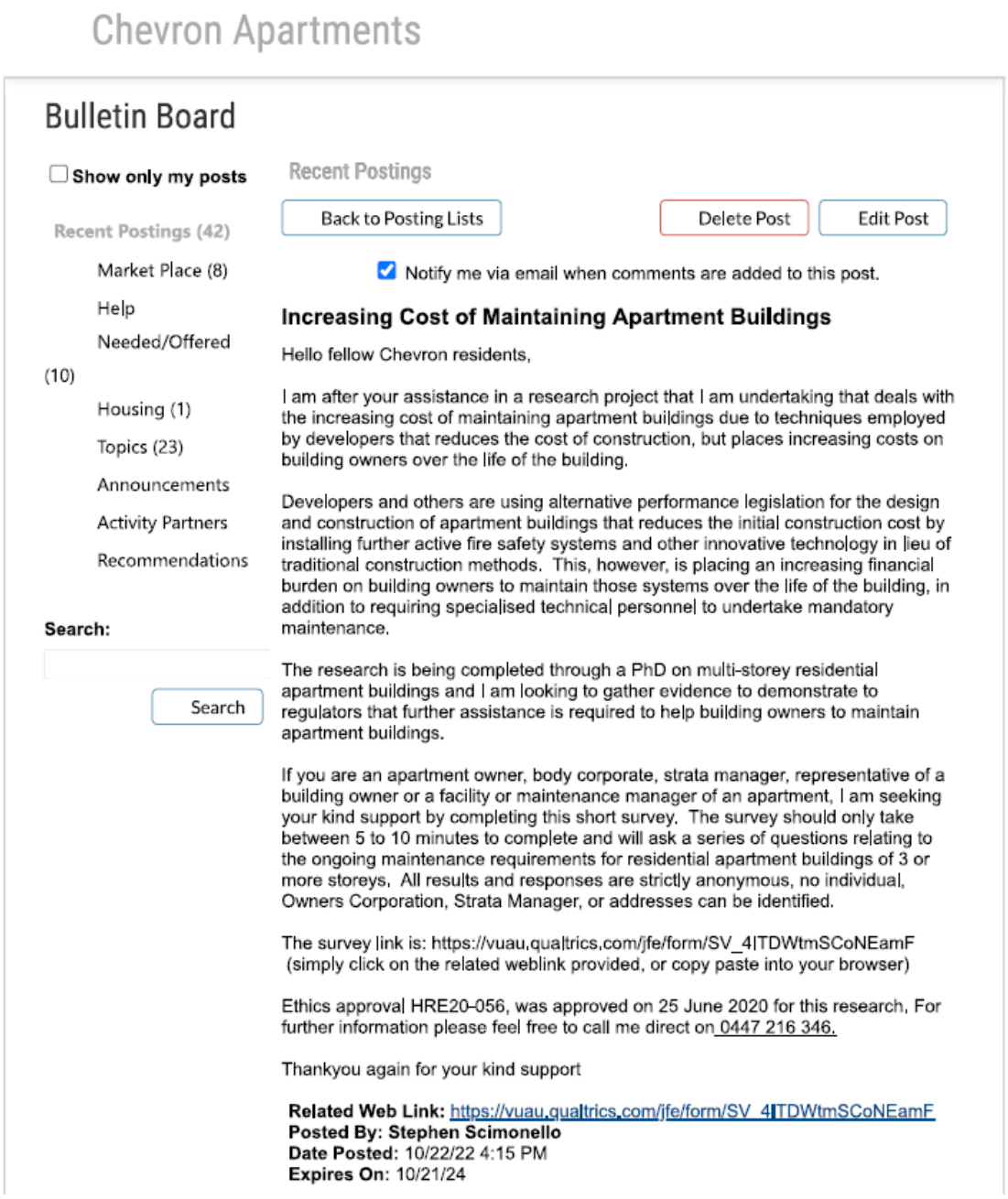
The survey link is: https://vuau.qualtrics.com/jfe/form/SV_4ITDWtmSCoNEamF

I have attached an information sheet and please feel free to call me direct on 0447 216 346 or e-mail stephen.scimonello@gmail.com or my supervisor Professor Annona Armstrong AM from the College of Business, Victoria University, Tel: 03 9919 6155.

Kind regards

Stephen Scimonello, PhD Candidate

Appendix F.7: Copy of E-mail Request Sent to Chevron Apartment Complexes



Chevron Apartments

Bulletin Board

Show only my posts

Recent Postings (42)

Market Place (8)

Help Needed/Offered (10)

Housing (1)

Topics (23)

Announcements

Activity Partners

Recommendations

Search:

Search

Recent Postings

Back to Posting Lists | Delete Post | Edit Post

Notify me via email when comments are added to this post.

Increasing Cost of Maintaining Apartment Buildings

Hello fellow Chevron residents,

I am after your assistance in a research project that I am undertaking that deals with the increasing cost of maintaining apartment buildings due to techniques employed by developers that reduces the cost of construction, but places increasing costs on building owners over the life of the building.

Developers and others are using alternative performance legislation for the design and construction of apartment buildings that reduces the initial construction cost by installing further active fire safety systems and other innovative technology in lieu of traditional construction methods. This, however, is placing an increasing financial burden on building owners to maintain those systems over the life of the building, in addition to requiring specialised technical personnel to undertake mandatory maintenance.

The research is being completed through a PhD on multi-storey residential apartment buildings and I am looking to gather evidence to demonstrate to regulators that further assistance is required to help building owners to maintain apartment buildings.

If you are an apartment owner, body corporate, strata manager, representative of a building owner or a facility or maintenance manager of an apartment, I am seeking your kind support by completing this short survey. The survey should only take between 5 to 10 minutes to complete and will ask a series of questions relating to the ongoing maintenance requirements for residential apartment buildings of 3 or more storeys. All results and responses are strictly anonymous, no individual, Owners Corporation, Strata Manager, or addresses can be identified.

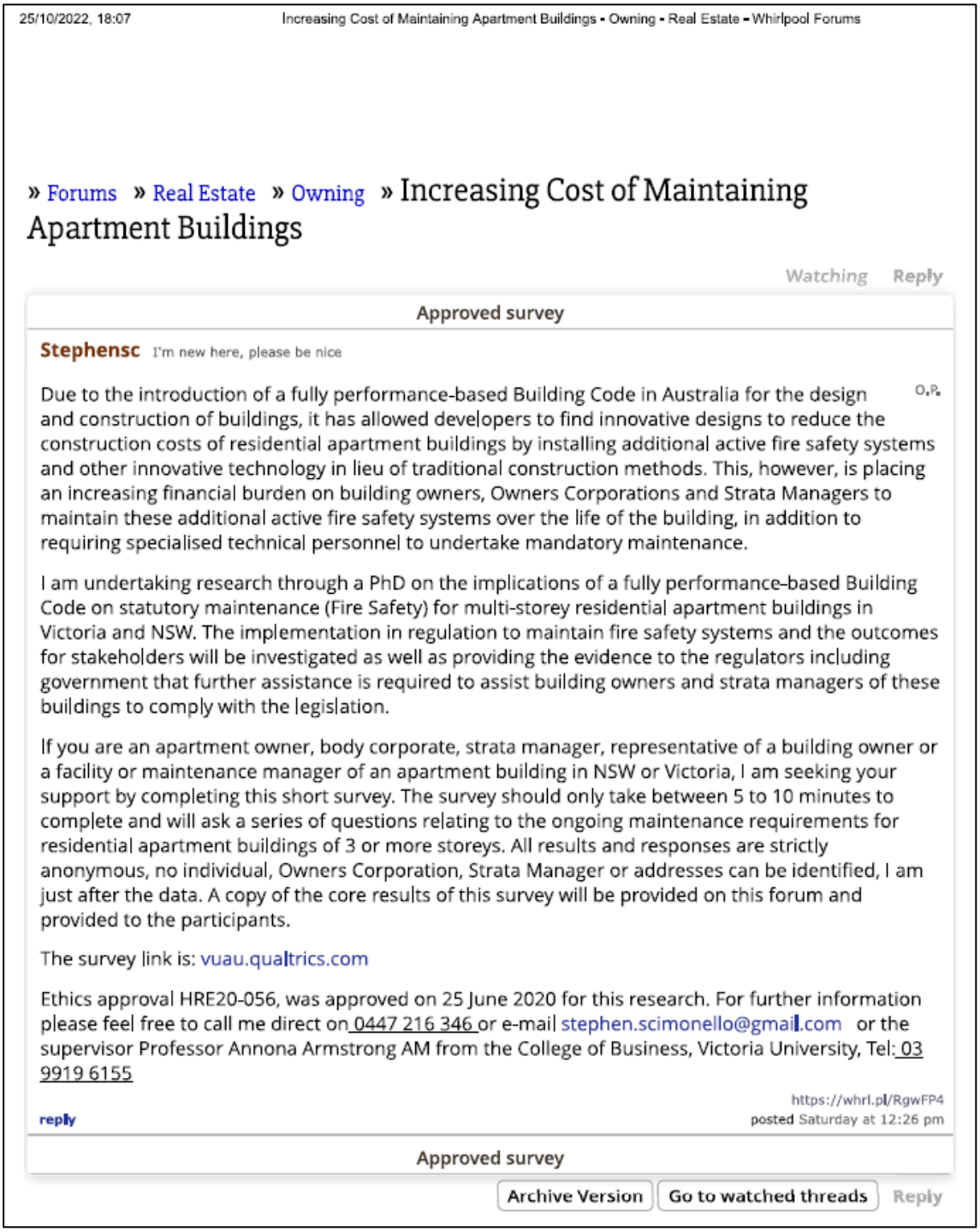
The survey link is: https://vuau.qualtrics.com/jfe/form/SV_4ITDWtmSCoNEamF
(simply click on the related weblink provided, or copy paste into your browser)

Ethics approval HRE20-056, was approved on 25 June 2020 for this research, For further information please feel free to call me direct on 0447 216 346.

Thankyou again for your kind support

Related Web Link: https://vuau.qualtrics.com/jfe/form/SV_4ITDWtmSCoNEamF
Posted By: Stephen Scimonello
Date Posted: 10/22/22 4:15 PM
Expires On: 10/21/24

Appendix F.8: Copy of E-mail Request Sent to National Whirlpool Online Real Estate Forum



25/10/2022, 18:07 Increasing Cost of Maintaining Apartment Buildings - Owning - Real Estate - Whirlpool Forums

» Forums » Real Estate » Owning » Increasing Cost of Maintaining Apartment Buildings

Watching Reply

Approved survey

Stephensc I'm new here, please be nice

Due to the introduction of a fully performance-based Building Code in Australia for the design and construction of buildings, it has allowed developers to find innovative designs to reduce the construction costs of residential apartment buildings by installing additional active fire safety systems and other innovative technology in lieu of traditional construction methods. This, however, is placing an increasing financial burden on building owners, Owners Corporations and Strata Managers to maintain these additional active fire safety systems over the life of the building, in addition to requiring specialised technical personnel to undertake mandatory maintenance.

I am undertaking research through a PhD on the implications of a fully performance-based Building Code on statutory maintenance (Fire Safety) for multi-storey residential apartment buildings in Victoria and NSW. The implementation in regulation to maintain fire safety systems and the outcomes for stakeholders will be investigated as well as providing the evidence to the regulators including government that further assistance is required to assist building owners and strata managers of these buildings to comply with the legislation.

If you are an apartment owner, body corporate, strata manager, representative of a building owner or a facility or maintenance manager of an apartment building in NSW or Victoria, I am seeking your support by completing this short survey. The survey should only take between 5 to 10 minutes to complete and will ask a series of questions relating to the ongoing maintenance requirements for residential apartment buildings of 3 or more storeys. All results and responses are strictly anonymous, no individual, Owners Corporation, Strata Manager or addresses can be identified, I am just after the data. A copy of the core results of this survey will be provided on this forum and provided to the participants.

The survey link is: vuau.qualtrics.com

Ethics approval HRE20-056, was approved on 25 June 2020 for this research. For further information please feel free to call me direct on 0447 216 346 or e-mail stephen.scimonello@gmail.com or the supervisor Professor Annona Armstrong AM from the College of Business, Victoria University, Tel: 03 9919 6155

https://whrl.pl/RgwFP4

reply posted Saturday at 12:26 pm

Approved survey

Archive Version Go to watched threads Reply

Appendix F.9: Copy of E-mail Distribution to the Property Owners Association of NSW

From: stephen scimonello <stephen.scimonello@gmail.com>

Date: Tue, Oct 18, 2022 at 5:13 PM

Subject: Maintenance Fire Safety Provisions of Apartment Buildings in NSW – Survey Request

To: <info@poansw.com.au>

Att: Property Owners Association of NSW,

My name is Stephen Scimonello and I am undertaking research through a PhD on the implications of a fully performance-based building code on statutory maintenance (Fire Safety) for residential apartment buildings in NSW.

The implementation in regulation to maintain fire safety systems and the outcomes for stakeholders will be investigated as well as providing the evidence to the regulators and government that further assistance is required to assist building and property owners of these buildings to comply with the policy.

Due to the nature of a fully performance-based building code appears to be increasing the complexity of fire safety systems being installed in residential apartment buildings and these fire safety systems require specialised technical personnel to maintain them over the life of the building that is placing a heavy financial burden on building owners and investors alike.

The purpose of this research is to develop a strategy that will promote compliance for building owners and companies that own or manage multi-storey residential apartment buildings within a deregulated building regulatory environment emanating from a performance-based building code.

I have a short questionnaire that I would kindly ask permission to post or distribute to your members that will ask a series of questions relating to the ongoing maintenance requirements of Fire Safety Systems in residential apartment buildings in NSW. All results and responses are strictly confidential, and no individual or addresses will be identified. I am just after the data. A copy of the core results of this survey will be provided to share on your website and to the participants. A comparison of the Victorian System vs the NSW legislative system will be analysed with the result to assist building owners and owners' corporations to better understand the legislation and promote compliance within the industry.

The survey link is: https://vuau.qualtrics.com/jfe/form/SV_4ITDWtmSCoNEamF

I have attached an information sheet for further information and please feel free to call me direct on 0447 216 346 or e-mail stephen.scimonello@gmail.com or my supervisor Professor Annona Armstrong AM from the College of Business, Victoria University, Tel: 03 9919 6155.

Response from Property Owners Association of NSW

From: John Gilmovich <john@poansw.com.au>
Date: Mon, Oct 24, 2022 at 1:50 PM
Subject: Re: Maintenance Fire Safety Provisions of Apartment Buildings in NSW – Survey Request
To: stephen scimonello <stephen.scimonello@gmail.com>
Cc: <info@poansw.com.au>, Himanshu Shee <Himanshu.Shee@vu.edu.au>, Anona Armstrong <anona.armstrong@vu.edu.au>

No problem, the survey will go out 5pm today.

Regards,
John Gilmovich | President
The Property Owners Association of NSW


M: +61 418 600 806 I Ph: +61 2 9363 3949
E: john@poansw.com.au
W: poansw.com.au

On Sun, Oct 23, 2022 at 6:44 PM John Gilmovich <john@poansw.com.au> wrote:

Hello Stephen,
Sorry for delay in responding, one of our committee members who took lead on this had fallen ill and could not complete this request. I have delegated to another team member and we will get this survey out to our member database.

Regards,
John Gilmovich | President
The Property Owners Association of NSW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Appendix G: Normality

Att_1 (Attitude) Normality

Descriptive Statistics (n = 54)							
		Mean	***SD***	**Skewness**		**Kurtosis**	
		Statistic	**Statistic**	**Statistic**	***SE***	**Statistic**	***SE***
Att 1.1	About the policy for maintaining essential fire safety systems – the policy is a good idea	4.48	.693	**–1.342**	.325	1.908	.639
Att 1.2	About the policy for maintaining essential fire safety systems – it is worthwhile	4.39	.811	**–1.501**	.325	2.186	.639
Att 1.6	About the policy for maintaining essential fire safety systems – it works well	3.46	.966	–.152	.325	–.361	.639
Att 1.7	About the policy for maintaining essential fire safety systems – I value the policy	3.83	.885	–.339	.325	–.557	.639
Att 1.8	About the policy for maintaining essential fire safety systems – the policy is essential for a building to remain safe for occupants	4.50	.746	**–1.416**	.325	1.418	.639
Att 1.9	About the policy for maintaining essential fire safety systems – the policy generates confidence, which is vital for industry	4.06	.856	–.484	.325	–.591	.639
Att 1.10	About the policy for maintaining essential fire safety systems – the policy requires the owner to be responsible for the implementation of the policy	3.85	1.089	–.788	.325	.086	.639
Valid N (listwise)							

As can be seen in the above, most correlations fall within the band; however, there are some values outside of normality range. Att 1.1, Att 1.2 and Att 1.8 fall outside of normal distribution range for skewness. Kurtosis however shows that all values are within the range of distribution.

SN_1 (Subjective Norm) Normality

Descriptive Statistics (N = 54)							
		Mean	***SD***	**Skewness**		**Kurtosis**	
		Statistic	**Statistic**	**Statistic**	***SE***	**Statistic**	***SE***
SN 1.4	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? – Members of your family	5.17	1.514	–.768	.325	.012	.639
SN 1.5	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? – Co-workers	5.83	1.299	**–1.393**	.325	2.306	.639
SN 1.6	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? – Friends	4.80	1.571	–.620	.325	–.177	.639
SN 1.7	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? – Peers	5.46	1.501	**–1.473**	.325	1.873	.639
SN 1.8	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? – Building occupants	6.31	1.061	**–2.249**	.325	**5.790**	.639
Valid N (listwise)							

As can be seen in the above, SN 1.5, SN 1.7 and SN 1.8 are outside the normal distribution for skewness; however, these are all with a negative value range providing scores above the mean. SN 1.8 is outside of standard normality and has positive values, indicating a peaked distribution.

PBC_1 (Perceived Behavioural Control) Normality

Descriptive Statistics (n = 54)							
		Mean	***SD***	**Skewness**		**Kurtosis**	
		Statistic	**Statistic**	**Statistic**	***SE***	**Statistic**	***SE***
PBC 1.3	I expect that the regulator will – provide support to owners to comply with the policy	5.37	1.916	–.888	.325	–.530	.639
PBC 1.5	I will be encouraged to complete all the essential fire safety maintenance provisions if I – receive support from the regulator	6.00	.991	**–1.694**	.325	**4.286**	.639
PBC 1.6	I will be encouraged to complete all the essential fire safety maintenance provisions if I – receive reminder notifications from the regulator	5.94	1.123	**–2.129**	.325	**6.650**	.639
PBC 1.7	I will be encouraged to complete all the essential fire safety maintenance provisions if I – am provided with specialised training	5.74	1.482	**–1.593**	.325	2.198	.639
Valid N (listwise)							

As can be seen in the above, PBC 1.5, 1.6 and 1.7 are outside the normal distribution for skewness; however, all have a negative value range providing scores above the mean. PBC 1.5 and 1.6 are outside of standard normality and have positive values, indicating a peaked distribution.

ENF_1 (Moderation Enforcement 1) Normality

Descriptive Statistics (n = 54)							
		Mean	***SD***	**Skewness**		**Kurtosis**	
		Statistic	**Statistic**	**Statistic**	***SE***	**Statistic**	***SE***
ENF 1.1	I will be discouraged to complete all the essential fire safety maintenance provisions if – I get fined by the regulator	4.07	1.852	–.168	.325	–1.042	.639
ENF 1.2	I will be discouraged to complete all the essential fire safety maintenance provisions if – I am punished in a court of law	3.93	1.912	–.109	.325	–1.134	.639
ENF 1.3	I will be discouraged to complete all the essential fire safety maintenance provisions if – my peers are not complying with the policy	4.52	1.840	–.512	.325	–.837	.639
ENF 1.4	I will be discouraged to complete all the essential fire safety maintenance provisions if – it is too difficult to complete all the fire safety maintenance provisions	5.07	1.779	–.910	.325	–.392	.639
Valid N (listwise)							

As can be seen in the above, all values for Enf. 1 fall within normality for skewness and kurtosis.

Int (Intention) Normality

Descriptive Statistics (n = 54)							
		Mean	***SD***	**Skewness**		**Kurtosis**	
		Statistic	**Statistic**	**Statistic**	***SE***	**Statistic**	***SE***
INT 1.1	I am confident that I can – take responsibility to manage all of the fire safety maintenance provisions on my building	4.89	1.610	–.715	.325	–.118	.639
INT 1.2	I am confident that I can – carry out all of the essential fire safety maintenance on my building over the next 12 months	5.15	1.676	**–1.192**	.325	.971	.639
INT 1.3	I am confident that I can – comply with the policy	5.44	1.423	**–1.046**	.325	.584	.639
Valid N (listwise)							

As can be seen in the above, INT 1.2 and 1.3 are outside the normal distribution for skewness; however, all have a negative value range providing scores above the mean whereas skewness is within standard normality and has positive values of distribution.

Appendix H: Multicollinearity Test Data

Multi Correlations: (n = 54)

		About the policy for maintaining essential fire safety systems ..... - the policy is a good idea	About the policy for maintaining essential fire safety systems - it is worthwhile	About the policy for maintaining essential fire safety systems - it works well	About the policy for maintaining essential fire safety systems - I value the policy	About the policy for maintaining essential fire safety systems - the policy is essential for a building to remain safe for occupants	About the policy for maintaining essential fire safety systems - the policy generates confidence, which is vital for industry	About the policy for maintaining essential fire safety systems - the policy requires the owner to be responsible for the implementation of the policy	Regarding the policy, do you believe that - there is great social pressure from the community to comply with the policy	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? - Co-workers	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? - Friends	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? - Peers	Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? - The building occupants	I expect that the regulator will - provide support to owners to comply with the policy	I will be encouraged to complete all the essential fire safety maintenance provisions if I - receive support from the regulator	I will be encouraged to complete all the essential fire safety maintenance provisions if I - receive reminder notifications from the regulator	I will be encouraged to complete all the essential fire safety maintenance provisions if I - am provided with specialised training	I will be discouraged to complete all the essential fire safety maintenance provisions if - I get fined by the regulator	I will be discouraged to complete all the essential fire safety maintenance provisions if - I am punished in a court of law	I will be discouraged to complete all the essential fire safety maintenance provisions if - My peers are not complying with the policy	I will be discouraged to complete all the essential fire safety maintenance provisions if - It is too difficult to complete all the fire safety maintenance provisions	I will be encouraged to complete all the essential fire safety maintenance provisions if I - receive support from the regulator	I will be encouraged to complete all the essential fire safety maintenance provisions if I - receive reminder notifications from the regulator	I will be encouraged to complete all the essential fire safety maintenance provisions if I - am provided with specialised training	I will be encouraged to complete all the essential fire safety maintenance provisions if I - am provided with a reward for providing a compliant building	I am confident that I can - take responsibility to manage all of the fire safety maintenance provisions on my building	I am confident that I can - carry out all of the essential fire safety maintenance on my building over the next 12 months	I am confident that I can - comply with the policy
About the policy for maintaining essential fire safety systems - the policy is a good idea	Pearson Correlation	1	.768**	.478**	.533**	.547**	.431**	.396**	-0.131	0.174	-0.081	0.072	.277*	0.062	-0.137	-0.110	-0.133	-0.263	-.300*	-0.229	-0.259	-0.098	-0.075	-0.143	-0.216	0.133	0.132	0.219
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.001	0.003	0.347	0.207	0.558	0.606	0.042	0.656	0.322	0.427	0.337	0.054	0.028	0.096	0.059	0.483	0.589	0.304	0.117	0.336	0.340	0.112
About the policy for maintaining essential fire safety systems - it is worthwhile	Pearson Correlation	.768**	1	.368**	.487**	.421**	.512**	.387**	-0.038	0.099	-0.070	-0.027	0.250	0.063	-0.047	-0.183	-0.072	-0.258	-0.249	-0.214	-.295*	0.009	-0.156	-0.065	-0.200	0.178	.276*	.338*
	Sig. (2-tailed)	0.000		0.006	0.000	0.002	0.000	0.004	0.783	0.479	0.615	0.848	0.068	0.649	0.736	0.185	0.607	0.059	0.070	0.121	0.030	0.947	0.261	0.639	0.147	0.197	0.043	0.012
About the policy for maintaining essential fire safety systems - it works well	Pearson Correlation	.478**	.368**	1	.578**	.432**	.402**	.282*	0.150	0.183	-0.123	-0.112	0.205	0.018	-0.118	-0.115	-0.165	-0.231	-0.175	-.276*	-.328*	-0.070	-0.108	-0.159	-0.017	0.155	.272*	0.218
	Sig. (2-tailed)	0.000	0.006		0.000	0.001	0.003	0.039	0.279	0.186	0.375	0.422	0.137	0.899	0.394	0.408	0.233	0.093	0.205	0.044	0.016	0.613	0.437	0.252	0.903	0.263	0.047	0.113
About the policy for maintaining essential fire safety systems - I value the policy	Pearson Correlation	.533**	.487**	.578**	1	.472**	.461**	.326*	-0.092	0.139	-0.093	-0.069	0.258	0.070	-0.108	-0.237	-0.249	-0.131	-0.152	-0.224	-.340*	-0.069	-0.223	-0.251	-.269*	0.079	0.195	0.195
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000	0.016	0.508	0.314	0.505	0.622	0.060	0.613	0.439	0.084	0.069	0.347	0.271	0.103	0.012	0.621	0.104	0.067	0.050	0.568	0.157	0.158
About the policy for maintaining essential fire safety systems - the policy is essential for a building to remain safe for occupants	Pearson Correlation	.547**	.421**	.432**	.472**	1	.576**	0.232	0.109	0.127	0.008	0.025	0.179	0.092	-0.077	-0.011	0.034	-0.178	-0.212	-0.206	-0.227	-0.013	0.023	0.026	-0.046	0.079	0.136	0.124
	Sig. (2-tailed)	0.000	0.002	0.001	0.000		0.000	0.091	0.432	0.362	0.954	0.856	0.196	0.506	0.582	0.936	0.806	0.199	0.124	0.135	0.098	0.926	0.870	0.854	0.744	0.572	0.327	0.370
About the policy for maintaining essential fire safety systems - the policy generates confidence, which is vital for industry	Pearson Correlation	.431**	.512**	.402**	.461**	.576**	1	.373**	0.249	0.042	0.009	-0.079	.292*	0.217	0.223	0.082	0.086	-0.253	-0.217	-0.019	-0.164	.271*	0.103	0.101	-0.123	0.059	0.191	0.134
	Sig. (2-tailed)	0.001	0.000	0.003	0.000	0.000		0.005	0.069	0.761	0.951	0.570	0.032	0.114	0.106	0.557	0.537	0.065	0.116	0.894	0.236	0.048	0.457	0.465	0.374	0.670	0.165	0.333
About the policy for maintaining essential fire safety systems - the policy requires the owner to be responsible for the implementation of the policy	Pearson Correlation	.396**	.387**	.282*	.326*	0.232	.373**	1	-0.034	0.116	-.305*	-0.061	0.041	0.027	0.192	0.147	0.023	-.369**	-0.259	-0.149	-0.248	0.227	0.162	0.044	-0.070	.270*	.271*	.457**
	Sig. (2-tailed)	0.003	0.004	0.039	0.016	0.091	0.005		0.805	0.405	0.025	0.660	0.768	0.847	0.163	0.287	0.872	0.006	0.058	0.281	0.071	0.099	0.242	0.752	0.613	0.048	0.048	0.001
Regarding the policy, do you believe that - there is great social pressure from the community to comply with the policy	Pearson Correlation	-0.131	-0.038	0.150	-0.092	0.109	0.249	-0.034	1	0.027	0.151	-0.113	0.035	.319*	0.047	0.111	0.103	-0.232	-0.159	0.100	0.105	0.062	0.114	0.105	0.207	0.147	0.099	-0.060
	Sig. (2-tailed)	0.347	0.783	0.279	0.508	0.432	0.069	0.805		0.847	0.274	0.417	0.800	0.019	0.736	0.426	0.459	0.092	0.251	0.473	0.448	0.656	0.413	0.452	0.133	0.289	0.477	0.667
	N	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? - Co-workers	Pearson Correlation	0.174	0.099	0.183	0.139	0.127	0.042	0.116	0.027	1	.334*	.495**	.682**	-0.035	0.103	0.136	-0.003	-0.112	-0.134	-0.129	-0.084	0.116	0.161	-0.005	-0.026	.361**	.306*	0.143
	Sig. (2-tailed)	0.207	0.479	0.186	0.314	0.362	0.761	0.405	0.847		0.013	0.000	0.000	0.800	0.460	0.328	0.981	0.418	0.333	0.353	0.544	0.404	0.245	0.972	0.851	0.007	0.024	0.303
Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? - Friends	Pearson Correlation	-0.081	-0.070	-0.123	-0.093	0.008	0.009	-.305*	0.151	.334*	1	.689**	.447**	.301*	0.049	0.004	0.147	0.239	0.127	0.233	0.228	0.046	0.013	0.137	0.126	-0.024	-0.010	-0.136
	Sig. (2-tailed)	0.558	0.615	0.375	0.505	0.954	0.951	0.025	0.274	0.013		0.000	0.001	0.027	0.728	0.976	0.288	0.082	0.361	0.090	0.097	0.738	0.927	0.323	0.362	0.863	0.944	0.327
Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? - Peers	Pearson Correlation	0.072	-0.027	-0.112	-0.069	0.025	-0.079	-0.061	-0.113	.495**	.689**	1	.511**	-0.008	0.000	0.105	0.250	0.042	-0.001	-0.034	0.107	-0.007	0.123	0.254	0.095	0.108	0.070	0.017
	Sig. (2-tailed)	0.606	0.848	0.422	0.622	0.856	0.570	0.660	0.417	0.000	0.000		0.000	0.953	1.000	0.449	0.068	0.764	0.994	0.808	0.441	0.961	0.378	0.064	0.496	0.439	0.616	0.905
Do you believe that the following people or groups expect that you will carry out all of the fire safety maintenance on your building? - The building occupants	Pearson Correlation	.277*	0.250	0.205	0.258	0.179	.292*	0.041	0.035	.682**	.447**	.511**	1	0.090	0.036	0.110	-0.103	-0.089	-0.128	-0.143	0.047	0.060	0.148	-0.099	-0.088	0.187	0.132	0.068
	Sig. (2-tailed)	0.042	0.068	0.137	0.060	0.196	0.032	0.768	0.800	0.000	0.001	0.000		0.517	0.797	0.429	0.458	0.522	0.357	0.302	0.734	0.666	0.286	0.476	0.528	0.177	0.340	0.623
I expect that the regulator will - provide support to owners to comply with the policy	Pearson Correlation	0.062	0.063	0.018	0.070	0.092	0.217	0.027	.319*	-0.035	.301*	-0.008	0.090	1	.378**	0.220	0.214	0.226	0.162	.394**	0.119	.365**	0.234	0.203	0.168	-0.011	0.082	-0.041
	Sig. (2-tailed)	0.656	0.649	0.899	0.613	0.506	0.114	0.847	0.019	0.800	0.027	0.953	0.517		0.005	0.110	0.120	0.100	0.241	0.003	0.391	0.007	0.088	0.142	0.225	0.938	0.553	0.770
I will be encouraged to complete all the essential fire safety maintenance provisions if I - receive support from the regulator	Pearson Correlation	-0.137	-0.047	-0.118	-0.108	-0.077	0.223	0.192	0.047	0.103	0.049	0.000	0.036	.378**	1	.695**	.463**	0.010	-0.040	0.124	-0.129	.991**	.701**	.462**	0.160	0.142	.273*	0.147
	Sig. (2-tailed)	0.322	0.736	0.394	0.439	0.582	0.106	0.163	0.736	0.460	0.728	1.000	0.797	0.005		0.000	0.000	0.941	0.775	0.371	0.354	0.000	0.000	0.000	0.248	0.306	0.046	0.288
I will be encouraged to complete all the essential fire safety maintenance provisions if I - receive reminder notifications from the regulator	Pearson Correlation	-0.110	-0.183	-0.115	-0.237	-0.011	0.082	0.147	0.111	0.136	0.004	0.105	0.110	0.220	.695**	1	.501**	-0.134	-0.178	-0.013	-0.083	.701**	.993**	.500**	0.205	.299*	.295*	0.216
	Sig. (2-tailed)	0.427	0.185	0.408	0.084	0.936	0.557	0.287	0.426	0.328	0.976	0.449	0.429	0.110	0.000		0.000	0.334	0.199	0.925	0.551	0.000	0.000	0.000	0.137	0.028	0.030	0.116
I will be encouraged to complete all the essential fire safety maintenance provisions if I - am provided with specialised training	Pearson Correlation	-0.133	-0.072	-0.165	-0.249	0.034	0.086	0.023	0.103	-0.003	0.147	0.250	-0.103	0.214	.463**	.501**	1	0.028	0.006	0.265	0.043	.464**	.491**	.996**	.480**	.280*	.297*	0.172
	Sig. (2-tailed)	0.337	0.607	0.233	0.069	0.806	0.537	0.872	0.459	0.981	0.288	0.068	0.458	0.120	0.000	0.000		0.842	0.963	0.053	0.756	0.000	0.000	0.000	0.000	0.040	0.029	0.214
	N	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
I will be discouraged to complete all the essential fire safety maintenance provisions if - I get fined by the regulator	Pearson Correlation	-0.263	-0.258	-0.231	-0.131	-0.178	-0.253	-.369**	-0.232	-0.112	0.239	0.042	-0.089	0.226	0.010	-0.134	0.028	1	.918**	.598**	.491**	0.001	-0.144	0.014	0.079	-.314*	-0.241	-0.263
	Sig. (2-tailed)	0.054	0.059	0.093	0.347	0.199	0.065	0.006	0.092	0.418	0.082	0.764	0.522	0.100	0.941	0.334	0.842		0.000	0.000	0.000	0.996	0.300	0.917	0.571	0.021	0.079	0.054
	N	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
I will be discouraged to complete all the essential fire safety maintenance provisions if - I am punished in a court of law	Pearson Correlation	-.300*	-0.249	-0.175	-0.152	-0.212	-0.217	-0.259	-0.159	-0.134	0.127	-0.001	-0.128	0.162	-0.040	-0.178	0.006	.918**	1	.569**	.507**	-0.041	-0.189	0.013	0.131	-.328*	-0.232	-0.237
	Sig. (2-tailed)	0.028	0.070	0.205	0.271	0.124	0.116	0.058	0.251	0.333	0.361	0.994	0.357	0.241	0.775	0.199	0.963	0.000		0.000	0.000	0.768	0.172	0.928	0.345	0.016	0.091	0.084
I will be discouraged to complete all the essential fire safety maintenance provisions if - My peers are not complying with the policy	Pearson Correlation	-0.229	-0.214	-.276*	-0.224	-0.206	-0.019	-0.149	0.100	-0.129	0.233	-0.034	-0.143	.394**	0.124	-0.013	0.265	.598**	.569**	1	.691**	0.120	-0.027	0.261	0.229	-.343*	-.301*	-.342*
	Sig. (2-tailed)	0.096	0.121	0.044	0.103	0.135	0.894	0.281	0.473	0.353	0.090	0.808	0.302	0.003	0.371	0.925	0.053	0.000	0.000		0.000	0.386	0.847	0.057	0.096	0.011	0.027	0.011
I will be discouraged to complete all the essential fire safety maintenance provisions if - It is too difficult to complete all the fire safety maintenance provisions	Pearson Correlation	-0.259	-.295*	-.328*	-.340*	-0.227	-0.164	-0.248	0.105	-0.084	0.228	0.107	0.047	0.119	-0.129	-0.083	0.043	.491**	.507**	.691**	1	-0.140	-0.092	0.044	.362**	-.392**	-.377**	-.349**
	Sig. (2-tailed)	0.059	0.030	0.016	0.012	0.098	0.236	0.071	0.448	0.544	0.097	0.441	0.734	0.391	0.354	0.551	0.756	0.000	0.000	0.000		0.313	0.506	0.754	0.007	0.003	0.005	0.010
I will be encouraged to complete all the essential fire safety maintenance provisions if I - receive support from the regulator	Pearson Correlation	-0.098	0.009	-0.070	-0.069	-0.013	.271*	0.227	0.062	0.116	0.046	-0.007	0.060	.365**	.991**	.701**	.464**	0.001	-0.041	0.120	-0.140	1	.707**	.463**	0.147	0.142	.277*	0.155
	Sig. (2-tailed)	0.483	0.947	0.613	0.621	0.926	0.048	0.099	0.656	0.404	0.738	0.961	0.666	0.007	0.000	0.000	0.000	0.996	0.768	0.386	0.313		0.000	0.000	0.287	0.305	0.042	0.264
I will be encouraged to complete all the essential fire safety maintenance provisions if I - receive reminder notifications from the regulator	Pearson Correlation	-0.075	-0.156	-0.108	-0.223	0.023	0.103	0.162	0.114	0.161	0.013	0.123	0.148	0.234	.701**	.993**	.491**	-0.144	-0.189	-0.027	-0.092	.707**	1	.490**	0.204	.311*	.309*	0.236
	Sig. (2-tailed)	0.589	0.261	0.437	0.104	0.870	0.457	0.242	0.413	0.245	0.927	0.378	0.286	0.088	0.000	0.000	0.000	0.300	0.172	0.847	0.506	0.000		0.000	0.138	0.022	0.023	0.086
I will be encouraged to complete all the essential fire safety maintenance provisions if I - am provided with specialised training	Pearson Correlation	-0.143	-0.065	-0.159	-0.251	0.026	0.101	0.044	0.105	-0.005	0.137	0.254	-0.099	0.203	.462**	.500**	.996**	0.014	0.013	0.261	0.044	.463**	.490**	1	.478**	.279*	.305*	0.185
	Sig. (2-tailed)	0.304	0.639	0.252	0.067	0.854	0.465	0.752	0.452	0.972	0.323	0.064	0.476	0.142	0.000	0.000	0.000	0.917	0.928	0.057	0.754	0.000	0.000		0.000	0.041	0.025	0.182
I will be encouraged to complete all the essential fire safety maintenance provisions if I - am provided with a reward for providing a compliant building	Pearson Correlation	-0.216	-0.200	-0.017	-.269*	-0.046	-0.123	-0.070	0.207	-0.026	0.126	0.095	-0.088	0.168	0.160	0.205	.480**	0.079	0.131	0.229	.362**	0.147	0.204	.478**	1	-0.023	-0.002	-0.021
	Sig. (2-tailed)	0.117	0.147	0.903	0.050	0.744	0.374	0.613	0.133	0.851	0.362	0.496	0.528	0.225	0.248	0.137	0.000	0.571	0.345	0.096	0.007	0.287	0.138	0.000		0.866	0.991	0.879
I am confident that I can - take responsibility to manage all of the fire safety maintenance provisions on my building.	Pearson Correlation	0.133	0.178	0.155	0.079	0.079	0.059	.270*	0.147	.361**	-0.024	0.108	0.187	-0.011	0.142	.299*	.280*	-.314*	-.328*	-.343*	-.392**	0.142	.311*	.279*	-0.023	1	.734**	.788**
	Sig. (2-tailed)	0.336	0.197	0.263	0.568	0.572	0.670	0.048	0.289	0.007	0.863	0.439	0.177	0.938	0.306	0.028	0.040	0.021	0.016	0.011	0.003	0.305	0.022	0.041	0.866		0.000	0.000
I am confident that I can - carry out all of the essential fire safety maintenance on my building over the next 12 months	Pearson Correlation	0.132	.276*	.272*	0.195	0.136	0.191	.271*	0.099	.306*	-0.010	0.070	0.132	0.082	.273*	.295*	.297*	-0.241	-0.232	-.301*	-.377**	.277*	.309*	.305*	-0.002	.734**	1	.850**
	Sig. (2-tailed)	0.340	0.043	0.047	0.157	0.327	0.165	0.048	0.477	0.024	0.944	0.616	0.340	0.553	0.046	0.030	0.029	0.079	0.091	0.027	0.005	0.042	0.023	0.025	0.991	0.000		0.000
I am confident that I can - comply with the policy	Pearson Correlation	0.219	.338*	0.218	0.195	0.124	0.134	.457**	-0.060	0.143	-0.136	0.017	0.068	-0.041	0.147	0.216	0.172	-0.263	-0.237	-.342*	-.349**	0.155	0.236	0.185	-0.021	.788**	.850**	1
	Sig. (2-tailed)	0.112	0.012	0.113	0.158	0.370	0.333	0.001	0.667	0.303	0.327	0.905	0.625	0.770	0.288	0.116	0.214	0.054	0.084	0.011	0.010	0.264	0.086	0.182	0.879	0.000	0.000	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Appendix I: Non-Response Bias Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
What state do you reside in?	Equal variances assumed	.228	.635	-.246	70	.403	.806	-.233	.947	-2.121	1.655
	Equal variances not assumed			-.245	64.218	.403	.807	-.233	.949	-2.128	1.662
Please indicate your Age	Equal variances assumed	.220	.641	-.876	68	.192	.384	-.283	.324	-.929	.362
	Equal variances not assumed			-.859	57.700	.197	.394	-.283	.330	-.944	.377
What is your current position?	Equal variances assumed	9.819	.003	1.013	67	.157	.315	.367	.362	-.356	1.089
	Equal variances not assumed			.964	48.507	.170	.340	.367	.380	-.398	1.131
What is you highest level of education obtained? - Selected Choice	Equal variances assumed	.457	.501	-.325	68	.373	.746	-.175	.539	-1.250	.900
	Equal variances not assumed			-.327	63.786	.373	.745	-.175	.536	-1.246	.896