VALUE PLATFORM EVOLUTION IN SERVICE INNOVATION ECOSYSTEMS: AN EXAMINATION OF THE DYNAMISM OF TENSIONS RESULTING FROM CO-EXISTING INSTITUTIONAL LOGICS

by

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Abstract

Advanced technologies assist diverse entities in becoming network actors, exchanging resources and co-creating value together to achieve service innovation. However, tensions emerge when multiple actors have different goals and expectations during the service innovation process. This thesis extends the service ecosystems literature by incorporating the evolution of value platforms in the service innovation process over time. The notion of value platforms facilitates our understanding of the dynamic interactions among actors to co-create value for the development of service innovation. The theoretical lens of institutional logics was applied in this study to explore the dynamic resource-related activities that occur as value platforms evolve. This thesis explores the evolution of value platforms embedded in service ecosystems during the service innovation process. It investigates how the resource-related activities evolve in service ecosystems throughout the process of service innovation and seeks to unravel the mechanism of actor interaction in platform-based service innovation.

In particular, the study investigates how value platforms embedded in service ecosystems evolve, what tensions arise throughout the evolution due to the multiple institutional logics of the actors within the ecosystem, and how multiple institutional logics are navigated as value platforms evolve. A critical realist approach is adopted to explore the phenomenon of value platform evolution. A process-based single-case study design with two embedded cases is implemented to investigate value platforms embedded in service ecosystems to develop telematics insurance services. The researcher conducted a two-phased data collection to gather semi-structured interviews and participant-generated drawings as primary data from different actors along with archival documents as the secondary data.

A realist evaluation enabled the delineation of the five stages that form the building blocks of the evolution of the value platforms. Moreover, an abductive approach identified three types of process-related tensions and three types of navigating mechanisms that emerge dynamically as value platforms evolve. This research offers theoretical contributions to a processual understanding of value co-creation in service ecosystems by explaining the evolution of tensions resulting from co-existing institutional logics and navigating mechanisms inherent in value platforms. It also highlights how regulatory actors affect service ecosystems during the process of service innovation. Furthermore, the study offers practitioners a processual understanding of tensions that occur in the service innovation process, and the approaches to navigating those tensions in service ecosystems during the service innovation process.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

The latest statistics indicate that spending on digital transformation is expected to surpass US$2.5 trillion in 2025 (Sava, 2022). In recent years, a significant shift has taken place in the focus of businesses from products to services, resulting in a change of the nature and process of innovation in the service sector (World Economic Forum, 2016). Technology has facilitated the transformation of businesses to a service-focused orientation, driving the need to collaborate with multiple external actors. Nowadays, innovation activities are jointly conducted by actors, the entities that participate in a specific project, through business networks rather than the traditional strategy of internal innovation (Tidd, Bessant, and Pavitt, 2018). Furthermore, the emergence of information and communication technologies has enabled diverse parties to all become actors in ecosystems, exchanging resources and co-creating value with each other (Breidbach and Maglio, 2016).

However, it is noteworthy that digital transformation has its pros and cons. On the one hand, it helps organisations to innovate and advance, which leads to success. On the other hand, organisations face losses when they fail to keep a close watch on changes in a fast-paced world. Notwithstanding the benefits and additional value resulting from collaboration among multiple actors, a great number of ecosystems encountered challenges from various aspects to achieve long-term sustainability. Even well-known organisations could fail if they do not pay attention to changes and navigate themselves during the service innovation process. Sony, for instance, launched its e-readers three years earlier than Kindle was introduced by Amazon. Nevertheless, Sony stopped selling e-readers in 2014. Meanwhile, Kindle has become a main player in the market. Sony neglected the potential of service innovation by only viewing its e-readers as devices, while Kindle was developed as a service that enables customers to reach a wide range of e-books and immediately download the books through Amazon's wireless network. Additionally, while Kindle has established an ecosystem that creates value for various parties, the open upload mechanism built into Sony Readers discouraged publishers from participating in the ecosystem due to concerns of copyright infringement.

Technologies used to be applied as facilitators to improve the efficiency of businesses, whereas modern organisations are now engaging themselves with implementing technologies as an essential element of the value co-creation process. While new

technologies bring benefits to organisations, actors are confronted with new challenges regarding managing value co-creation in a service ecosystem, in which actors are "connected by shared institutional logics and mutual value creation through service exchange" (Lusch and Nambisan, 2015, p. 161; Vink et al., 2021). On the one hand, the connections between interaction processes cause adjustments to resources and activities across institutions. On the other hand, adjustments made by the actors also shape the interactions correspondingly. In other words, actors interact with various actors synchronously, and an interaction between two actors may potentially influence their interactions with other actors (Ford et al., 2008).

As technology brings different types of actors together to co-create value, the phenomenon of the platform starts to evolve. Platforms increasingly enable service firms to co-create value with multiple actors within an ecosystem to achieve innovation (Trabucchi et al., 2019). As an emergent notion, value platforms emphasise the dynamic activities executed by actors which maintain, transform, and adapt resources for value co-creation (Perks et al., 2017). As a result, value platforms are embedded in service ecosystems since they connect different groups of actors on which they impact, giving value and meaning to generate and activate resources within service ecosystems. Nevertheless, the notion of value platforms in service ecosystems is still emerging and has not received sufficient empirical attention to date (Perks et al., 2017).

Notably, the evolution of value platforms is underpinned by institutional settings and institutional logics. Value platforms concern dynamic interactions among actors (such as firms, institutions, and public actors). These actors co-create value and either directly or indirectly shape each other's actions and reactions in a platform-based ecosystem (Perks et al., 2017). Institutional settings enable value co-creation as technology and institutions shape resource integration, while institutional logics and actors' behaviour mutually shape each other (Thornton and Ocasio, 2008). Value platforms highlight the connections among multiple actors to create value constellations purposefully in innovation processes, while service ecosystems emphasise that actors' actions and behaviour are guided by shared institutional logic to connect and coordinate for value co-creation (Storbacka et al., 2016). Thus, the institutional logic perspective provides a theoretical framing for the evolution of value platforms embedded in service ecosystems.

Although the majority of value co-creation studies focus on the positive aspects of ecosystems, it is noteworthy that multiple actors may have different and conflicting goals and interests in ecosystems (Pera, Occhiocupo, and Clarke, 2016). However,

when tensions are left unmanaged, organisations can face costly consequences. According to a recent study published by Acas (2021), the cost of conflict is around £28.5 billion for organisations in the UK every year, and it was estimated that around 10 million employees experienced conflict between 2018 and 2019. Additionally, a CIPD (2020) report depicted that 26% of employees and 20% of employers view conflict in the workplace as a common phenomenon. Service innovation is conceptualised as a process of institutionalisation. When diverse actors seek to develop service innovation in service ecosystems, tensions emerge, driven largely by conflicting values and expectations. Actors may face challenges in the process of service innovation since current regulations, infrastructure, and practices are implemented to accommodate the existing technology rather than radically new technologies (Geels, 2002).

Not only do advanced technologies disrupt customers' daily lives and the business world, but they have created challenges in other aspects such as regulations and government policies. Hence, the impact of digital transformation has expanded from networks to ecosystems. For instance, Uber created a platform that offers ride-hailing services which generated disruptions in the taxi industry across several countries. Uber entered Taiwan as an internet-based technology platform in 2013, which led to complaints and protests from local taxi drivers and fleet companies since Uber was not regulated by the government as a transportation company. Uber's operation was controversial from both an economic and a legal point of view. Economically, local drivers complained about Uber for tax evasion due to its transaction mechanism. From a legal aspect, the emergence of Uber highlighted the deficiency of transportation regulations. Uber was not regulated by the government since it was registered as an information management company despite providing ride-hailing services. Hence, Uber eliminated the controversy by collaborating with local car rental companies to conform with the current legal framework. Nevertheless, such collaboration strategy caused local taxi drivers to question the legitimacy of Uber, operating as it was in a grey area between car rental service and taxi service. Eventually, the situation pressured the government into amending regulations which required drivers, vehicles, and service platforms to all be legal. In summary, innovation creates changes and tensions for both private and public actors within ecosystems over time.

Drawing from an institutional perspective, every actor's behaviour and actions are guided by multiple institutional logics during value co-creation processes. When actors conform their actions and behaviour to shared institutional logics in service ecosystems, actors gain legitimacy. By contrast, actors encounter tensions when multiple and

conflicting institutional logics result in institutional complexity. This is because actors have limited influence over each other in a service ecosystem (Edvardsson et al., 2010). This situation simultaneously influences actors' actions and outcomes of value co-creation (Baumann-Pauly, Scherer, and Palazzo, 2016). Growing attention has been placed on tension resulting from co-existing institutional logics and the navigating mechanisms adopted by actors (Sadeh and Zilber, 2019). However, there is still a lack of understanding regarding tensions that occur due to co-existing institutional logics and navigating mechanisms from a processual perspective. In this study, the co-existence of multiple institutional logics results in tensions at the ecosystem level, which drive the process of institutionalisation.

To address the gaps identified in the relevant literature, this research attempts to unfold a set of resource-related activities that presents the evolution of value platforms through service exchange and the interactions among actors in service ecosystems. This study draws on concepts of value platforms and the theoretical lens of institutional logics to investigate the mechanisms of actor interaction in platform-based service innovation. Specifically, the study focuses on resource-related activities as value platforms evolve in service ecosystems within the context of service innovation, over time.

The main objective of the study is to explore the phenomenon of value platform evolution from the theoretical lens of institutional logics. This study seeks to explore dynamic actor interactions as value platforms evolve in service ecosystems to develop service innovation. The process of service innovation offers a contextual setting to unfold a processual aspect of institutionalisation. Specifically, focus is placed on tensions resulting from co-existing institutional logics as value platforms evolve for service innovation to enrich the understanding of value co-creation from an institutional perspective (Ranjan and Read, 2021). Since tensions within value co-creation do not occur within a given moment in time, taking a processual perspective to investigate the evolution of value platforms is considered suitable. Therefore, the research proposes three questions: 1) How do value platforms embedded in service ecosystems evolve? 2) What tensions arise throughout the evolution due to the multiple institutional logics of the actors within the ecosystem? 3) How do actors navigate multiple institutional logics as value platforms evolve?

A critical realist standpoint is adopted to uncover the mechanisms that underlie the complex and dynamic nature of resource-related activities in ecosystems to develop service innovation over time (Easton, 1995). A single case study of the telematics service ecosystem with two embedded value platforms is implemented in this research

to explore the service innovation process of telematics insurance in Taiwan. Telematics insurance is a type of motor insurance service where telematics technology is adopted to monitor driving behaviour to calculate motor insurance premiums for individuals. In the research, multiple sources of data were collected from participants involved in the development process of telematics insurance services. Participants were selected from actors in the telematics service ecosystem, such as insurance companies, technology firms, insurance agents, and the insurance regulator. Afterwards, semi-structured interviews and participant-generated drawings of network pictures and critical incidents were collected from participants. A network pictures approach and critical incident technique were incorporated into the interview procedure. These two data collection techniques serve to help the researcher investigate and visualise the evolution of actor relationships and the sequence of events during the service innovation process. Moreover, archival documents such as annual reports of actors, online news and magazine articles, and written regulations were obtained as secondary data in the research. For data analysis, a realist evaluation approach was adopted to depict the explanation of how value platforms evolve over time (Pawson and Tilley, 1997). An abductive approach was adopted to investigate the development process of service innovation in service ecosystems (Chandler et al., 2019). This enables iteration between the emergent conceptualisation of value platform evolution through an institutional approach and the empirical data (Gioia, Corley, and Hamilton, 2012).

The findings unravelled five stages that constitute value platform evolution in the case data. Furthermore, three types of tension caused by co-existing institutional logics and three types of navigating mechanism that emerge dynamically in the evolution of value platforms are presented to address the research questions. This research offers theoretical contributions to the service ecosystem literature through the incorporation of a dynamic and processual perspective to value platforms. The findings indicate that tensions and navigating mechanisms evolve over time and arise from the dynamic nature of value platforms during the service innovation process. The results contribute to the body of research on platforms in the following ways. They 1) provide a processual perspective to the articulation and explanation of tensions resulting from co-existing institutional logics inherent in value platforms for service innovation, 2) identify and unravel the nature and evolution of navigating mechanisms and the way they impact on such tensions, 3) identify the influence of regulatory actors as impediments and facilitators in service ecosystems over time. Moreover, the findings also offer practitioners a deeper understanding of tensions associated with service innovation and provide guidance in terms of the means to manage tensions amongst multiple actors in service ecosystems throughout the service innovation process.

1.2 Research Objectives

This research focuses on investigating the mechanisms of actor interaction in platform-based service innovation. The research aims to develop a processual understanding of value platforms embedded in service ecosystems for service innovation from a tension perspective. This research proposes three research questions as follows: 1) How do value platforms embedded in service ecosystems evolve? 2) What tensions arise throughout the evolution due to the multiple institutional logics of the actors within the ecosystem? 3) How do actors navigate multiple institutional logics as value platforms evolve?

1.3 Structure of the Thesis

Six chapters constitute this thesis. Chapter 1 provides the introduction of the research to the reader. In Chapter 2, the existing literature associated with the major constructs of the study, namely service innovation, value co-creation, service ecosystems, and platform-based service innovation are discussed. Afterwards, the theoretical underpinnings of the study are discussed. Chapter 3 presents the methodology of the research. Firstly, critical realism is justified as the philosophical stance of the study. Secondly, the research design in relation to an exploratory research approach, a process-based single-case study, units of analysis, and the contextual setting of the innovation of telematics insurance services are elaborated. Thirdly, verbal and visual research methods adopted in this study to collect and analyse empirical data are discussed. Subsequently, the sampling and the process of data collection and data analysis are demonstrated. Eventually, the chapter finishes by discussing the quality and methodological limitations of the study. In Chapter 4, the findings of the research are demonstrated. The five stages of value platform evolution are illustrated, followed by the presentation of the results at a theoretical level regarding the process-related tensions resulting from co-existing institutional logics and the corresponding navigating practices in service ecosystems. Discussions between the results and extant literature are debated in Chapter 5. Ultimately, Chapter 6 summarises the overview of the research and its theoretical contributions and managerial implications. The chapter concludes by indicating the limitations of the study and the directions for future research.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

The focus of the study is the processual aspect of resource-related activities for the development of service innovation. This chapter reviews the relevant constructs and the theoretical underpinnings that lay the foundation for the phenomenon of value platform evolution. More specifically, this section illustrates the structure of the literature review chapter. In Section 2.2, the evolution of service innovation literature and its conceptualisation are reviewed since service innovation provides a context that focuses on advanced technologies changing the way value is created and co-created among actors. Recently, a significant amount of attention has been paid to service across various sectors due to the transformational developments in technologies. Moreover, the existing literature of service ecosystems, which multiple actors co-create value for the development of service innovation, is reviewed in Section 2.3. In Section 2.4, the notion of value platforms is introduced to narrow the research focus to the dynamic and processual aspect of actors co-creating value to achieve service innovation within service ecosystems. However, the understanding of value platforms is still in its infancy, which is a gap that the researcher seeks to address in this study. The literature review presents the interplay between the constructs of service innovation, service ecosystems, and value platforms by articulating extant knowledge and identifying gaps that lead to the research objectives of the study. Afterwards, the theoretical lens of institutional logics, through which the evolution of value platforms is empirically explored in the study, is demonstrated in Section 2.5.

2.2 Service Innovation

2.2.1 The evolution of service innovation literature

The origins of service innovation literature can be traced back to the literature of new product development (NPD) over the past few decades. The NPD domain has been well-explored in terms of its process and the factors that contribute to the success of the NPD process. Scholars have proposed various models of the NPD process varying from simplified to detailed depiction of how new products are developed by organisations to achieve innovation. For instance, Booz, Allen and Hamilton (1982) captured the eight stages of NPD as follows: new product strategy, idea generation, screening, evaluation, concept testing business analysis, development, testing, and commercialisation. Their seminal work has built the foundation for the NPD process. In addition, several generations of the Stage-Gate model have been proposed for years (Cooper, 1994, 2016),

indicating that certain standards must be met at each stage for the project to move on to the next stage. That is to say, the NPD process emphasises linear, formal, and structured processes for developing new products.

However, as more NPD models were identified in the literature, the results gradually developed from sequential to overlapping stages (Alam and Perry, 2002). During the evolution of the NPD literature, new service development (NSD) literature emerged as some scholars shifted their interests from product innovation towards service innovation. The NSD literature published around the 1980s often considered NSD models rooted in the NPD literature, and scholars tended to apply NPD frameworks to the context of service development (Biemans, Griffin, and Moenaert, 2016). Early NSD studies have developed various models which indicate the formalised and structured nature of NSD processes. For instance, Bowers (1989) proposed an eight-stage NSD model based on the linear NPD model developed by Booz, Allen and Hamilton (1982) to study the development of new services in banks, insurance companies, and hospitals. Furthermore, Scheuing and Johnson (1989) depicted a 15-stage NSD model that presents a detailed process of how new services are developed. Additionally, it is also noteworthy that the discussion of NSD processes in early NSD studies was limited to idea generation and market launch stages, and only a few studies expanded the service innovation process to the post-launch phase.

Gradually, researchers distinguished services from goods by highlighting the four characteristics of services, namely, intangibility, heterogeneity, perishability, and inseparability. Although most of the NSD models were developed from existing NPD models, which suggested NSD as structured and formalised innovation processes for organisations (Kurtmollaiev and Pedersen, 2022), the empirical evidence of the nature of NSD processes was gradually found to be inconsistent with this perspective. Some studies found that a formal NSD process was adopted, while other scholars reported the development of new services as a rather informal process (Alam and Perry, 2002; Pellizzoni et al., 2020).

Thus, there is a current debate about the nature of service innovation process. While early service innovation studies have directly drawn on the models from the NPD literature to demonstrate the structured models of NSD, recent studies of service innovation have started criticising such taken-for-granted assumptions (Biemans, Griffin, and Moenaert, 2016). Pellizzoni et al. (2020) highlighted its dynamic nature regarding the involvement and knowledge-sharing among diverse actors in NSD processes. The authors argued that previous NSD studies mostly considered interactions

among diverse actors only at the implementation and commercialisation stages of the new service development process. As a result, a research gap remains in the service innovation literature as scholars have called for clarification of how service innovation is developed in nature over time and among diverse actors.

2.2.2 Technologies facilitating service innovation

According to data from World Bank (2019), services already accounted for over 60% of gross domestic product (GDP) at the beginning of the 21st century. Intangible services have received substantial attention within businesses, with the conventional business concept shifting from a product-oriented to a service-oriented viewpoint. Although the impact of technologies has been acknowledged in the past twenty years, their role has transformed, from merely being technological instruments in the service delivery process to being essential resources. The focus of attention within innovation research is shifting from only considering tangible goods to including service offerings, which mainly involve information content (Trabucchi and Buganza, 2019). The transformational developments in technologies have drawn attention to service across socioeconomic sectors, which stimulates new opportunities in service innovation.

The traditional perspective has gradually shifted towards firms' dependence on customer participation and input, such as the labour, information, and property provided by customers (Marcos-Cuevas et al., 2016). Consumer preferences keep changing rapidly because of the demand for innovation, flexibility, and a shorter time-to-market, and organisations may encounter the mismatching issue of supply and demand, which causes risky and costly investments for organisations (Scholten and Scholten, 2012). Nowadays, modern technologies reduce the perceived distance among actors involved in the innovation process by integrating customers and suppliers into the design and development process of service innovation (Khaksar et al., 2016). Advanced technologies enable companies to collaboratively create value and innovate with their customers through instant interactions.

With the support of advanced technologies, organisations obtain customers' real-time feedback so that firms can form and modify their services accordingly and simultaneously (Oertzen, Mager, and Odekerken-Schröder, 2017). This further suggests that service firms start utilising technologies to learn from their customers and offer more customised and knowledge-intensive services by establishing a more open approach to innovation (Lichtenthaler, 2011; Greer and Lei, 2012). In addition, consumers participate as value co-creators and users rather than passive receivers in the value creation process. That is to say, value co-creation distinguishes itself from the

conventional notion of value creation by enhancing customer engagement within the innovation process (Prahalad and Ramaswamy, 2004).

2.2.3 Value co-creation in service innovation

Recently, there has been considerable change in the nature and process of innovation across industries (Lusch and Nambisan, 2015). Unlike implementing in-house innovation strategies in the past, innovations are conducted through the joint action of actors within a business network, such as partners, customers, and independent inventors (Chesbrough, 2003). Chesbrough presented two open innovation examples, Procter & Gamble and Lego. The two organisations have extended their innovation approaches, from internal innovation to opening their R&D to external parties such as their customers or other external entities. Additionally, in the high-tech industry, organisations execute the notion of open platforms, allowing vibrant innovations around their offerings. Hence, service innovation often involves organisations collaborating with external entities, which forms collaborative networks since advanced technologies allow firms to create value and innovate with their external entities by opening their business models.

Service firms jointly innovate and create value with business partners, customers, and independent inventors to offer customised and knowledge-intensive services (Greer and Lei, 2012; Barrett et al., 2015). Service innovation was illustrated by Lusch and Nambisan (2015, p. 161) as "the rebundling of diverse resources that create novel resources that are beneficial (i.e. value experiencing) to some actors in a given context". Their statement emphasised the two features, which are value experiencing during the innovation process and actors involved in value co-creation, that would benefit from the innovation. Most importantly, the focus of value co-creation among actors by using innovations and other resources has surpassed that of the output of innovation (Prahalad and Ramaswamy, 2004).

The concept of value comprises several dimensions regarding economic value, social value, emotional value, and epistemic value (Caridà, Edvardsson, and Colurcio, 2019). For example, economic value refers to the benefits received by customers through the usage of the product or the service (Briggs and Grisaffe, 2010). Social value highlights the benefits extracted from interactions in a social context (Caridà, Edvardsson, and Colurcio, 2019). Moreover, Austin and Seitanidi (2012) proposed four sources of value in collaborations, namely resource complementarity, resource nature, resource directionality, and linked interests. Resource complementarity emphasises that value is co-created as actors collaborate to obtain access to specific resources they require but

do not internally possess. Furthermore, resource nature focuses on actors mobilising and leveraging the required resources such as knowledge, money, positive reputations, and capabilities. Resource directionality emphasises the way resources are deployed. The authors argued that new value is co-created since new services or activities are produced by combining complementary and idiosyncratic resources. Subsequently, multiple actors may have divergent goals and may perceive value differently. This indicates the importance of linked interests in collaborative relationships.

2.2.4 Value co-creation from a service perspective

At present, value and service are the two main subjects that prompt marketing researchers and practitioners to obtain more in-depth knowledge of the value co-creation processes to optimise the efficiency and effectiveness of service systems (Lusch and Nambisan, 2015). While value co-creation could be explored from various aspects, analysing the phenomena of actor interaction and resource integration is suggested to help scholars understand networks and relationships in an actor–network context (Gummesson and Mele, 2010; Russo-Spena and Mele, 2012). In contrast with the two-sided dyadic supplier–customer relationships, business networks are based on the premise that various companies constitute inter-organisational relationships to co-create value within a complicated economic system (Aarikka-Stenroos and Ritala, 2017).

In the past few decades, there has been a substantial change in the service sector, which has influenced the way researchers understand the concept of service. The concept of service in organisational offerings has changed due to the emergence of service-dominant logic (SDL) (Koskela-Huotari and Vargo, 2016). Vargo and Lusch (2004, 2006) illustrated that SDL is linked with the resource-based view of exchange and theories of the firm due to the focus on the resource aspect. They proposed the foundation of SDL – that service is exchanged for service – which changes the conventional view of organisational offerings, such as goods and services. Service in SDL is defined as "the application of specialised competencies (operant resources—knowledge and skills), through deeds, processes, and performances for the benefit of another entity or the entity itself" (Vargo and Lusch, 2004, p. 2). That is to say, service is perceived as applied resources, in which resources are categorised as operant resources and operand resources, and are no longer static. On the one hand, operant resources are resources that can take action or be combined with other resources to create value. For example, employees, other value creation actors, and consumers are part of the operant resources. On the other hand, operand resources refer to resources that need to be acted upon to create value. Hence, the concept of units of output is not

limited to products like goods or services; instead, it is viewed as mutually satisfying interactive processes (Edvardsson and Tronvoll, 2013). It is indicated that value is collaboratively created through the interactive configurations of mutual exchange (Preikschas et al., 2017).

Actors exchange services to create new potential resources, which enable them to co-create value through resource integration (Autio and Thomas, 2018). Although some of the utilised resources may exist in the company, the firm may outsource the other resources from other actors within a business network to achieve service exchange. Drawing on SDL, Vargo, Koskela-Huotari, and Vink (2020) emphasised the generalisation of traditional characters of producer and consumer into all actors in a system of other actors, where value is co-created through resource integration and service provision. This has led to the conceptualisation of resource integration from a network perspective. All actors are seen as not only resource integrators in a network of actors but also potential innovators and value co-creators (Lusch and Nambisan, 2015). To sum up, SDL provides the perspective that value is co-created through actor-to-actor interaction by paying attention to dynamic and interrelated relationships among actors (Verleye et al., 2017).

2.3 Service Ecosystems

2.3.1 Service ecosystems formed by multiple actors to innovate

Through the service-centred view of resource integration, the concept of resources has shifted from being static to being defined as actors interacting with each other in service ecosystems (Siaw and Sarpong, 2021). The concept of service ecosystems was built upon SDL, which draws attention to divergent actors and their dynamic interaction for resource integration (Jaakkola, Aarikka-Stenroos, and Ritala, 2019). Service ecosystems are defined as "the aggregation of networks of resource-integrating, service-exchanging actors, which are connected and coordinated by shared institutional logics" (Berthod, Helfen, and Sydow, 2019, p. 319). The view of service ecosystems highlights the importance of actor interaction in resource integration to achieve service innovation (Koskela-Huotari et al., 2016). Unlike a network approach, which focuses on linkages between actors, various types of stakeholders such as providers and customers are all viewed as actors in service ecosystems, which shifts the focus to a dynamic view of value co-creation, actor interaction, and social context.

It is noteworthy that a value network could be considered as a service ecosystem, which emphasises the interactions among a variety of actors involved in a system (Lusch et

al., 2010; Holmqvist and Diaz Ruiz, 2017). A value network is explained by Lusch, Vargo, and Tanniru (2010, p. 20) as "a spontaneously sensing and responding spatial and temporal structure of largely loosely coupled value proposing social and economic actors interacting through institutions and technology". Value networks are formed by seemingly unrelated actors and allow the formation of a macro-structure that is more fluid, responsive, and flexible (Granovetter, 1983). Previously, studies adopted a value network approach due to the underlying deficiency of traditional dyadic relationships in a value chain. A value network focuses on co-producing service offerings, exchanging service offerings, and co-creating value (Lusch, Vargo, and Tanniru, 2010). In other words, the value network is conceptualised as a net that connects multiple actors or participants through direct and indirect links, in which they all aim to deliver value, either to their direct customers or the end consumers. It makes the assumption that the firm acts as a participant in co-creating value within a more extensive network of organisations. In order to achieve spontaneously sensing and responding networks, actors within a value network are required to have adaptability and agility (Lusch et al., 2010).

Moreover, the importance of adopting a service ecosystem perspective in service innovation allows the inclusion of diverse actors that influence value co-creation during the process of service innovation. An ecosystem is composed of diverse actors such as suppliers, complementors, competitors, academic institutions, customers, and regulators (Thomas and Autio, 2014). For instance, government agencies have an impact on value co-creation in a service ecosystem by determining policymaking and influencing regulatory bodies. The decision and behaviour of government bodies and regulatory agencies were found to either positively or negatively affect value co-creation. Strict regulations could prevent inappropriate products or services from being provided to customers (Frow, McColl-Kennedy, and Payne, 2016). In contrast, certain regulatory practices can limit knowledge diffusion.

Furthermore, recent studies have suggested taking the role of government bodies into account while studying service innovation since their behaviour and decision could influence the activities of other actors and actor interactions in the process of service innovation. In Jaakkola, Aarikka-Stenroos, and Ritala's (2019) work, they identified a wide range of actors in healthcare service ecosystems such as government bodies, regulatory agencies, healthcare authorities, and patients. They found that regulatory bodies in their case of developing service innovation in a healthcare setting facilitate other actors to innovate despite other actors being unwilling to make changes. More recently, scholars have been calling for a more in-depth understanding of the emergence

of ecosystems from a processual perspective since actors' roles may change over time (Dedehayir, Mäkinen, and Ortt, 2018). Additionally, more studies have encouraged the investigation of how public actors such as government agencies and regulatory bodies influence the emergence of service ecosystems (Kaartemo, Nenonen, and Windahl, 2020; Pushpananthan, and Elmquist, 2022).

2.3.2 Value co-creation in service ecosystems

Through the service ecosystem view, service innovation is considered a process of actors exchanging and combining resources by adopting novel approaches (Perks, Gruber, and Edvardsson, 2012; Jaakkola, Aarikka-Stenroos, and Ritala, 2019). That is to say, service innovation provides opportunities for actors to co-create value in a service ecosystem (Vargo, Wieland, and Akaka, 2015). In other words, the notion of service ecosystems emphasises service exchange for value co-creation and the social context of service exchange (Berthod, Helfen, and Sydow, 2019). Service exchange and its social context mutually shape each other in service ecosystems. Due to rising interest in value co-creation in marketing and management literature, a substantial number of researchers have studied value co-creation in the innovation process from different stakeholders' perspectives (Gnyawali and Park, 2011). However, few studies have explored innovation projects from an ecosystem perspective regarding the value co-creation process in service innovation by drawing from different actors at the same time (Kazadi, Lievens, and Mahr, 2016). The extant literature tends to scrutinise one specific type of stakeholder, and the attention of co-creation between service providers and service beneficiaries is mainly placed on customer participation in the majority of service literature.

Actors drive value propositions, which facilitate connections among actors, as an actor or a constellation of actors invite other interested actors with complementary resources to jointly co-create value (Tronvoll and Edvardsson, 2020). In recent years, there has been an increased interest in studying value co-creation as an ecosystem-level phenomenon. Ranjan and Read (2021) constructed a conceptual map of value co-creation by drawing it from an ecosystem perspective. More specifically, most studies have explored positive aspects of value co-creation in ecosystems, while it is also important to note that having multiple actors in a service ecosystem may result in tensions, since their goals and interests may not be similar (Pera, Occhiocupo, and Clarke, 2016).

2.3.3 Service innovation process in service ecosystems

Drawing on the emergence of service ecosystems, the process of service innovation can be understood as the interdependence between actors, resources, and value propositions. As service ecosystems are "self-contained, self-adjusting" in nature, this suggests that service ecosystems are emergent (Vargo and Lusch, 2016, p. 10–11). Polese et al. (2021) proposed that a service ecosystem emerges as new properties arise through the interactions between actors and resources, which create changes to the ecosystems. Here, new properties were defined by the authors as new resources, values, institutional logics, and practices. One aspect of service innovation focuses on the recombination of actors and resources in service ecosystems (Tronvoll and Edvardsson, 2020). Studies have highlighted that actors' behaviour influences the innovation process through orchestration practices. Orchestration practices refer to the activities through which actors purposefully build and manage the ecosystem (Reypens, Lievens, and Blazevic, 2019). A processual view of innovation unravels the emerging tensions and the dynamic orchestration practices. Reypens, Lievens, and Blazevic (2019) highlighted that orchestration practices varied as divergent actors collaborated in an ecosystem over time.

The collaboration and participation of actors generate the innovation outcomes that stress the contextual phases of the service innovation process (Oertzen, Mager, and Odekerken-Schröder, 2017). Nevertheless, the service innovation literature often neglects the development aspect of services and mostly implements a cross-sectional approach (Witell et al., 2015). Therefore, recent studies have shifted interest onto the processual aspect of service innovation. As service innovation is presented through the collaboration among diverse actors in service ecosystems, this indicates that the attention has switched to processes and contexts in which value is created rather than the output of innovation (Edvardsson et al., 2018). Although the extant literature focuses on investigating how successful innovations were achieved, examining the development process of service innovation in service ecosystems was urged by scholars to unfold the processual aspect of service innovation (Aal et al., 2016).

2.4 Platform-based Service Innovation in Service Ecosystems

2.4.1 Platform notions

The term ‘platform’ is becoming ubiquitous and has been discussed broadly and conceptualised by various approaches within different fields of research, ranging from economics and management to technology (Thomas, Autio, and Gann, 2014; Porch, Timbrell, and Rosemann, 2015). The development of platform notions is considered as an evolving process from organisational platforms to industry platforms (Gawer, 2009). Nevertheless, the concept of platforms is developing towards a more network- and value-centric approach due to the rapid growth in the service sector (Perks et al., 2017). The platform notion begins to concentrate on the cooperative actions between network actors instead of the features and constitutions of goods. In other words, value is acknowledged during the interaction process rather than the notion of value-in-use.

Notwithstanding, numerous aspects of platforms are still vague and require further exploration, and a consensual understanding of platforms has not been reached due to the various definitions of platforms, such as markets, digital technologies, and processes. Researchers have identified types of platform in order to provide a better conceptualisation of platform notions (Gawer, 2009; Thomas, Autio, and Gann, 2014; Porch, Timbrell, and Rosemann, 2015), but the theoretical aspect in platform literature is often overlooked in prior studies. Therefore, a literature review for different streams of platform concepts is presented to illustrate the development, evolution, and new forms of platforms along with some practical examples. Afterwards, value platforms as an emerging concept will be introduced. An overview of platform notions is presented in Table 1 at the end of the section.

2.4.1.1 *Product platforms*

A broadly cited definition of product platforms is “the collection of assets shared by a set of products” (Robertson and Ulrich, 1998, p. 20) where assets refer to a collection of components, processes, knowledge, and relations. This type of platform is categorised by Gawer and Cusumano (2014) as an internal platform. The platforms in this stream generally imply product platforms within organisations; platforms here represent the stable core with the variable periphery in a product family (Baldwin and Woodard, 2009). Gawer and Cusumano (2014) stated that the concept of platforms was adopted to illustrate the modularisation of a family of products for a specific organisation in product development research in the 1990s. Take the automotive sector for example: Volkswagen Group developed a certain platform as a foundation in order to build several vehicle models based on different customer needs.

Despite aligning with the product family stream, Gawer (2009) possessed a more detailed viewpoint of platforms in this stream by distinguishing the difference between internal platforms and supply chain platforms. Internal platforms position all assets within the company, whereas supply chain platforms distribute some assets through supply chains (Gawer, 2009). The product family stream evolves from innovation and product development literature, which is often associated with modularisation in the automotive industry and builds upon the resource-based view of creating advantages and dynamic capabilities. Firms increase their flexibility and efficiency by leveraging a platform, which combines the structure of the fundamental capabilities that deliver the product or service with the technical architecture of the product or service.

2.4.1.2 *Platforms as market intermediaries*

As a growing stream of platforms, the market intermediary stream originally evolved from industrial economics research and has been increasingly adopted in recent marketing and management studies. The platform is defined by Thomas, Autio, and Gann (2014) 'Architectural leverage: putting platforms in context', Academy of Management Perspectives, 28(2), pp. 198–219. (2014, p. 203) as "a link or facilitator between two or more markets or groups of producers and users" and is often termed as a multi-sided platform or two-sided platform in this stream (Rochet and Tirole, 2003). That is to say, platforms play the role of intermediaries when there are two or more sides in a market, and both sides generate network benefits for the other; in other words, network externalities or network effect (Muzellec, Ronteau, and Lambkin, 2015). A typical case for multi-sided platforms is Uber, which acts as a marketplace that creates interactions and matches participants from the supply and demand sides by utilising advanced technologies. As Rochet and Tirole (2003) described, most markets with network externalities have the characteristics of two different groups who benefit from their interaction through a common platform. Notably, multi-sided platforms differentiate themselves from the traditional market intermediaries. A multi-sided platform is usually a product, service, or technology provided by a platform owner or a particular organisation, which facilitates the transactions between each side but has no control over the services or goods offered within the platform (Boudreau and Hagiu, 2009; Hagiu, 2014).

Therefore, it is argued that multi-sided platforms draw on the theoretical bases of market power (Katz and Shapiro, 1985) and the resource-based view of competitive advantage (Barney, 1991). Platforms in this stream are referred to business models that connect multiple groups of customers, and each group makes different contributions in the

platform (Bogers et al., 2017). With the increasing integration of technology and innovation concepts into business models, firms are required to develop capabilities, such as orchestrating networks and information technology (Bogers et al., 2017; Perks et al., 2017). Nonetheless, more studies are encouraged to unravel the strategic choices within these business models acting as platforms since the main body of multi-sided platform research tends to examine the economic aspect of multi-sided platforms. Even though the assumption of platforms from the economic aspect states that platforms already exist while conducting the research, the ideas of technological change, dynamics of competition, and organisational processes of the emerging platforms and their ecosystems are rarely explored but are expected to provide scholars with a more in-depth understanding of the platform development process (Gawer and Cusumano, 2015).

It is notable that the notion of non-digital platforms evolved long before that of digital platforms, such as multi-sided platforms and two-sided platforms. In this way, platforms are examined from the theoretical economic perspective. which considers them as types of market (Gawer, 2014). Rochet and Tirole (2004, p. 5) proposed that “a platform enables or facilitates the interaction between the two sides provided that they indeed want to interact”. The exact interaction between the two sides is suggested by Rochet and Tirole (2004) to be clearly identified, even though the interaction could be interpreted in various ways.

Table 1. An overview of platform notions

Streams of platform notion	Types of platforms	Key contributions	Theoretical roots	Main characteristics
Product platforms	Product family platforms; Internal platforms; Supply chain platforms	Simpson (2004); Jiao, Simpson, and Siddique (2007)	Resource-based view; Dynamic capability	• Traditionally focuses on durable goods whose production processes involve manufacturing. • The concept applies to the service context. • Definition: products that meet the needs of a core group of customers but are designed for easy modification into derivatives through the addition, substitution or removal of features. • Advantages: fixed-costs savings, reusing of common parts to gain efficiency in product development, the ability to produce a large number of derivative products, and gaining flexibility in product design. • Examples: automotive, aircraft and equipment manufacturing.
Market intermediary stream	Multi-sided platforms; Two-sided platforms	Gawer (2009); Hagiu and Wright (2015); Rochet and Tirole (2003, 2004, 2006)	Resource-based view; Market power; Social exchange theory	• Platforms connect and facilitate two or more markets or groups of producers and users. • Platform owner has no ownership of the platform, and it profits from the extra value created through market intermediation. • Example: credit card sector.
Value platforms and Platform ecosystems	Value platforms;	Perks et al. (2017)	Network orchestration; Industrial network theory	• A value platform is defined as 'dynamic configurations of (tangible and intangible) resources that act as a foundation upon which network members co-create value through a set of specific practices'. • Emphasises the role of network actors and dynamic activities. • The value-creating system within a network. • From technology and innovation management literature. • Platforms serve as a hub or a central point of control within a technology-based business system. • Ecosystem-based view by Moore (1996). • Example: Telematics insurance service
	An evolving meta-organizational form around technology platforms	Ceccagnoli et al. (2012); Gawer and Cusumano (2008)	Resource dependence theory	

2.4.2 Value platforms

2.4.2.1 *Platform ecosystems and platform leadership*

The concept of platform ecosystems has emerged from a combination of several aspects of platform literature (Hendricks and Matthyssens, 2022), such as platform orchestration, co-innovation, co-evolution, and platform development. The stream of platform ecosystems research plays a crucial role in the technology and innovation management literature. As the platform literature grew, platform ecosystems were conceptualised and defined differently, depending on the focus of the study. The concept of platform ecosystems is related to digital platforms, which facilitate the connection between multiple actors as ecosystems. However, it is noteworthy that platform ecosystems tend to stress the technological aspect which links organisations, third-party developers, and end-customers together within digital platforms. Scholars such as Järvi and Kortelainen (2017, p.552) have viewed a platform ecosystem as a technology ecosystem, which "organises actors around a shared technology platform". In contrast, certain studies recognised a platform ecosystem as collaborating networks of business partners developed around platform providers (Thomas, Autio, and Gann, 2014; Nambisan and Sawhney, 2011; Gawer and Cusumano, 2014; Toivanen et al, 2015). Furthermore, platform ecosystems were initially defined by Ceccagnoli et al. (2011, p. 266) as "the network of innovation to produce complements that make a platform more valuable".

For instance, the Apple iOS ecosystem, one of the most frequently discussed platform ecosystem examples, is developed upon a software platform that combines Apple's operating system and its related app store. Apple is the platform provider and manages the core elements. Meanwhile, it opens its platform and shares technological information about its platform interfaces and products with complementors like application developers and complementary providers. Thus, complementors are allowed to reuse the core elements to generate diverse and various products in the same ecosystem.

Nevertheless, the definition of platform ecosystems has recently shifted towards an evolutionary nature where it is described as "an evolving meta-organizational form characterized by enabling platform architecture, supported by a set of platform governance mechanisms necessary to cooperate, coordinate and integrate a diverse set of organizations, actors, activities, and interfaces, resulting in an increased platform value for customers through customized platform services" (Jovanovic et al., 2021, p2).

Choi and Phan (2012) conceptualised platform leadership by drawing on resource dependence theory and applied the platform ecosystem concept in the context of high-technology industry. In contrast with previous studies that recognised platform leaders as supporters and coordinators, Choi and Phan pointed out that intentional dependence may have not only beneficial but also harmful effects on the actors within the ecosystem. Organisations involved in the platform ecosystem make conscious decisions on their own behalf; meanwhile, they collaborate with each other to accomplish envisioned innovation. Platform actors in the ecosystem modify and develop corresponding plans for themselves based on their prediction and recognition of the platform leader's strategic purpose. At the centre of a platform ecosystem stands the platform leaders, which are firms that drive innovation across the industry based on an evolving system of separately developed parts of technology (Cusumano and Gawer, 2002). Intel and Microsoft as platform leaders became valuable control points in the industry. For instance, Intel implemented the strategy of attracting investors' and complementors' attention to a new market by supporting a complementor in an obvious way that other organisations follow. The lead firm in a platform intends to acquire resources externally by forming the ecosystem from a strategic perspective, which enables the lead firm to have a particular influence on the network actors. Although the platform leader manages the relationships within the networks of the platform, it only has limited influence on other network actors.

Platforms are considered as business ecosystems within the platform ecosystem stream, in which Thomas, Autio, and Gann (2014, p. 201) interpreted platforms as "a set of shared core technologies and technology standards underlying an organisational field that supports value co-creation through specialisation and complementary offerings". Similarly, the industry platform concept presented by Gawer (2009) also belongs to this stream. The industry platforms are defined as the products, technologies or services which form the building blocks that act as a foundation for an array of organisations to develop complementary innovations for products, technologies, or services, and have the potential to create network effects. This elaboration has highlighted the theoretical perspectives on network externality, resource dependence, and industrial community (Möller and Halinen, 2017). Moreover, a study conducted by Gawer (2014) suggests that both the economic perspective of platform competition and the engineering design perspective of platform innovation should be integrated in order to obtain a more holistic understanding of how platforms operate and evolve.

Despite the identical feature of reusable common components or technologies in both internal and industry platforms, Gawer and Cusumano (2008) distinguished industry

platforms from internal platforms by emphasising the openness of firms to their outside organisations. In other words, an industry platform provides a foundation technology or service, which is fundamental for a broader, interdependent ecosystem of businesses. As a result, platform owners give up the control of the platform to a certain extent, where complementors can join and innovate upon the platform.

The platform ecosystems literature has adopted various theories to investigate platform ecosystems (Mukhopadhyay and Bouwman, 2019). For example, resource dependency theory (RDT) was applied by some platform ecosystems studies to explore the control mechanisms. RDT blurs the boundaries among actors and highlights the fact that organisations are viewed as open systems. When actors rely on the important and scarce resources possessed by other actors, this indicates that actors' control mechanisms in platform ecosystems can be influenced by other actors.

2.4.2.2 *The notion of value platforms*

Platforms have been investigated from different angles ranging from technological to economic perspectives (Trabucchi et al., 2021). The development of the platform notion has shifted from organisational and multi-sided platforms (Gawer, 2009) to, more recently, a more network- and value-centric approach. Therefore, a value-centric approach has transformed the traditional view of innovation processes into orchestration rather than control and enables external interactions rather than focusing on internal processes (Tronvoll and Edvardsson, 2020). Here, the focus is placed on the interaction process among actors in a collaborative network to co-create value, namely the value platform (Perks et al., 2017). The notion of value platforms is firstly introduced by Perks et al. (2017, p. 107) as "dynamic configurations of (tangible and intangible) resources that act as a foundation upon which network members co-create value through a set of specific practices". As shown in Figure 1, the authors visualised how a value platform acts as the foundation for the value-creating system. From their viewpoint, it is the dynamic activities executed by actors rather than the static resources which maintain, transform, and adapt resources. That is to say, only actors have an impact on giving value and meaning to generate and activate resources.

This study draws on the concept of service ecosystems rather than platform ecosystems since service ecosystems offer a more holistic scope of actors and stress the importance of dynamism. Moreover, the focus of this research is about the institutional aspect, which is usually associated with service ecosystems. In contrast, the scope of platform ecosystems may potentially neglect other actors participating in an ecosystem. It is because platform ecosystems centre on digital aspects, network partners, and business

actors, while service ecosystems compromise not only firms and customers but also their social communities and other stakeholders (Merz et al., 2009; Fehrer, Woratschek, and Brodie, 2018). As a result, this study adopted the construct of service ecosystems rather than that of platform ecosystems. As a result, the present study further illustrates the phenomenon of value platforms evolution among multiple actors in service ecosystems in Figure 2.

One of the value platform examples identified by Perks et al. (2017) is the telematics insurance service. The insurance industry is transforming from a product-oriented perspective to a service innovation mindset. The development of telematics insurance services is acknowledged as a value platform; the organisation senses the platform value for external actors since telematics technology, connectivity, and knowledge allow the actor network to establish a unique constellation in a value co-creation model.

Drawing on the streams classified by Thomas, Autio, and Gann (2014), the value platform concept incorporates the ideas of platforms as a structure to store organisational routines and a bundle of shared technologies and principles that indicate the combination of the organisational stream and platform ecosystem stream respectively. As value platforms emphasise the actors' role and the feature of the value-creating system within a network, the lead firm is responsible for co-creating value not only with their customers but also with their network actors who are involved in the platform development process. However, the lead firm has insufficient control over them.

The traditional service sectors tend to deliver services by providing a physical place or offering face-to-face assistance. However, due to the fast-changing technology, service sectors are integrating technologies into their businesses by modifying their approaches of designing and producing products and services. Nevertheless, this has created new challenges for the lead firm to manage the platform because it shares captured value with other network actors and relies on them to develop the platform together. Hence, platforms allow firms to transform their innovation processes by employing a more open approach in the service industries, since organisations collaborate with not only other firms but also consumers in these innovation processes.

Notwithstanding recent emphasis on platforms, the process aspect regarding how platforms are developed and grown has been given scant attention in the literature (Schmidt et al., 2020). Furthermore, few empirical studies have investigated the process of service innovation from a value platform perspective. Additionally, this study

responds to recent calls for empirical research on actors' interactions and relationships and the mechanisms of network orchestration (Laczko et al., 2019; Lehtinen, Peltokorpi, and Artto, 2019).

More studies are called upon to deepen the knowledge of value platforms since there are several aspects of value platforms that have not been studied. Previous studies tended to address the role of lead firms in value platforms, yet perspectives from different groups of actors require a more in-depth understanding since they are all involved in the platform (Perks et al., 2017). Moreover, Perks et al. (2017) suggested that value platforms, which are initiated or co-developed by other actors such as consumers or firms in other industries rather than the lead firms, would provide fruitful knowledge about the formation of value platforms.

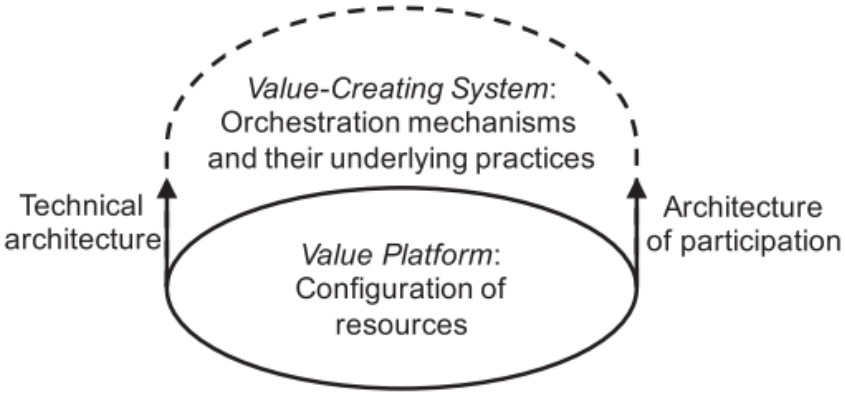


Figure 1. Value platform as a foundation for the value-creating system (Perks et al., 2017, p. 108)

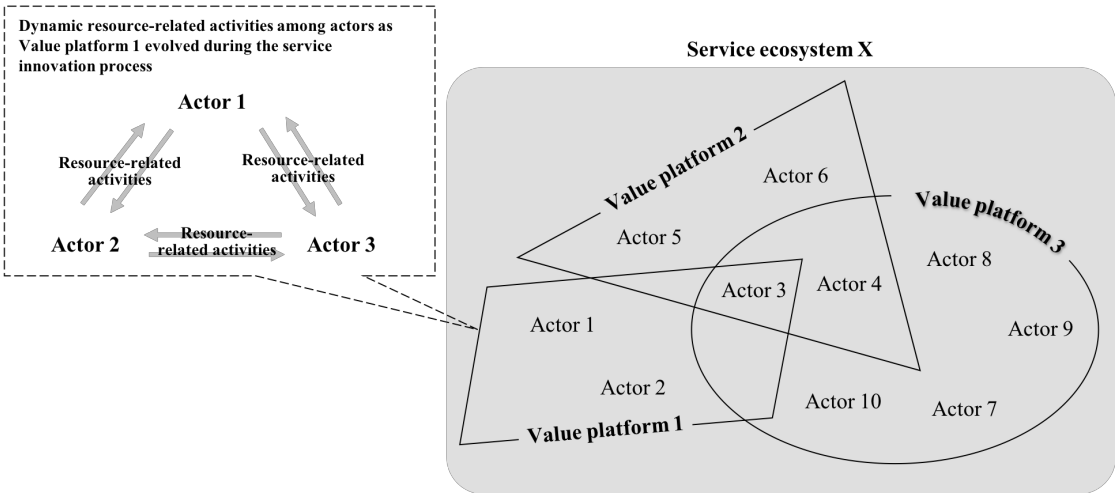


Figure 2. Conceptualisation of the dynamic resource-related activities among multiple actors in value platforms evolution within a service ecosystem

2.4.3 Value platforms in service ecosystems during the process of service innovation

Actors have an impact on giving value and meaning to generate and activate resources since they manage resources. That is to say, the dynamic phenomenon of resource integration enables multiple actors to co-create value as value platforms evolve in service ecosystems. The notion of value platforms allows researchers to depict the process of resource integration in the emergence of service ecosystems. Caridà, Edvardsson and Colurcio (2019) viewed resource integration from a processual aspect by suggesting the resourceness of potential resources and actor interaction as the antecedent of resource integration. Such a statement is aligned with the evolution of value platforms regarding the dynamic nature of resources, and resources are configured and re-configured for value co-creation. It is noteworthy that few studies have explored the process of how value is co-created among actors to achieve service innovation. Existing studies tend to focus on certain aspects of service innovation, such as technical development or service innovation within a specific period. Moreover, recent studies have underlined the need to investigate the whole process of service innovation regarding the evolution of novel service processes and how such processes influence the interactions among diverse actors in service ecosystems (Jaakkola, Aarikka-Stenroos, and Ritala, 2019).

Aarikka-Stenroos and colleagues (2017) extracted three distinct stages in the innovation process from a technological perspective, namely, envisioning, developing, and commercialising. The envisioning stage refers to concepts around initial goal setting, while the developing stage focuses on activities conducted by actors to develop the service. Finally, the commercialising stage involves activities such as launching and diffusing the novelty to the market and society. In addition, Payne and colleagues (2020) identified five stages in the value proposition implementation process in B2B contexts. The five stages are value design and assessment, value quantification, value communication, value documentation, and value verification and review. Nevertheless, the understanding of value propositions in the service innovation process is still unclear. Furthermore, Caridà and colleagues (2019) viewed resource integration as an enabler to create value in service ecosystems. The authors conceptualised resource integration as an emerging process while actors seek to co-create value. Matching, resourcing, and valuing were the three stages identified by them during the value co-creation processes. The matching stage emphasises actor interaction for the fitting of available resources such as ideas and knowledge sharing. The resourcing stage refers to the operation of the available resources from actors, such as resource creation and resource integration. However, it is noteworthy that not only positive but negative value is derived in this

stage, since actors' negative perceptions and experiences in the value formation process may affect how they determine the value. Subsequently, the valuing stage focuses on actors' assessment of the value they realise in the resourcing stage. Interestingly, the authors highlighted the idea of intended and unintended value as the outcome of value co-creation. They provided an alternate approach of viewing the outcome of value co-creation as intended and unintended value, rather than the dichotomy of positive and negative value.

In this study, the notions of value platforms and service ecosystems are combined to understand how actors co-create value and manage the process of service innovation over time. However, little is known regarding how value platforms evolve in the process of service innovation over time since the notion of value platforms is still at a conceptual level. Thus, the study draws on this body of literature to develop its first research question: How do value platforms embedded in service ecosystems evolve? Moreover, the current study draws on the institutional aspect to develop a deeper explanation and provide a theoretical lens for such a process. This is reviewed and discussed in the following section.

2.5 Theoretical Underpinnings of Value Platforms Evolving in Service Ecosystems

2.5.1 The notion of institutional logics from a service ecosystems view

Institutional settings and institutional logics constitute the core elements of value platforms in service ecosystems. It is noteworthy that institutions and actors mutually influence each other during the process of value co-creation. The integration of SDL and the service ecosystem view highlights that institutions are considered as key elements in the process of value co-creation and resource integration (Vargo, Wieland, and Akaka, 2016). From an institutional settings perspective, value is co-created as resources integration is shaped by technology and institutions. That is to say, institutions affect the coordination of exchanges by starting, framing, and regulating interactions at the same time, which may further have an impact on value co-creation (Vargo, Wieland, and Akaka, 2015). Institutions, as part of more comprehensive and interrelated institutional logics, refer to humanly devised rules, norms, values, and meanings that facilitate or impede value co-creation and resource integration in service ecosystems (Edvardsson et al., 2014).

Several institutions are nested in service ecosystems that have an impact on each other. The concept of institutions is defined by Greenwood et al. (2008, p.4–5) as "more-or-

less taken-for-granted repetitive social behaviour that is underpinned by normative systems and cognitive understandings that give meaning to social exchange and thus enable self-reproducing social order". From this perspective, the evolution of value platforms builds upon the concept of institutional arrangements, which "interrelated sets of institutions that together facilitate coordination of value co-creation in service ecosystems" (Tronvoll and Edvardsson, 2020, p. 1609). The framework of three institutional pillars introduced by Scott (2013) suggested that the regulative pillar, normative pillar, and cultural-cognitive pillar constitute institutions along with the relevant activities and resources that offer meaning and stability to social life. The regulative pillar refers to activities around rules, laws, monitoring, and sanctioning, which restrict and regularise actors' behaviour (Thornton, Ocasio, and Lounsbury, 2012). The normative pillar refers to norms, values, and objectives that define the prescriptive, evaluative, and obligatory dimensions in social life and the suitable ways to pursue them. The cultural-cognitive pillar refers to shared logics formed by social reality and frames through which meaning is derived. Nevertheless, Wieland, Vargo, and Akaka (2016) have underlined the insufficient understanding of how institutions in markets influence the processes of institutionalization within service ecosystems.

The institutional logics perspective offers a metatheoretical framework for analysing the evolution of value platforms in service ecosystems. Institutional logics provide a link between institutions and actors' actions in the sense that institutional logics shape actors' behaviour, while actors also shape and change institutional logics (Thornton and Ocasio, 2008). The role of platforms in the innovation process can be understood through the emergence of service ecosystems (Tronvoll and Edvardsson, 2020). Value platforms facilitate innovation processes through a more open approach of external collaboration, as diverse groups of actors are connected to purposefully create value constellations. By incorporating the concept of service ecosystems in value platforms, actor interaction and actions are guided by shared institutional logics within a service ecosystem. This is the aggregation of networks formed by actors sharing institutional logics to coordinate and connect with each other for resource integration and service exchange (Storbacka et al., 2016; Vargo and Lusch, 2016). Additionally, the interaction between two actors may influence their interactions with other actors involved in the project (Ford et al., 2008). To sum up, institutional logics and institutions facilitate the value co-creation process as value platforms evolve in service ecosystems.

Thornton and Ocasio (1999, p. 804) defined institutional logics as "the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize

time and space, and provide meaning to their social reality". The concept of logics refers to the rules which guide actors' actions, interactions, and interpretations, and which shape actors' activities, interactions, and roles (Kurtmollaiev et al., 2018). It is assumed that logics guide actors' interests, identities, and values, which serve as a context for outcomes and actors' decisions in service ecosystems (Thornton and Ocasio, 2008). Logics shape actors' practices by guiding them to identify which issues need to be resolved (Thornton, 2002). Drawing from the definition of institutional logics, Kurtmollaiev and colleagues (2018) highlighted the role of institutional logics in resource integration. Moreover, they further stressed the need to investigate the dynamic nature of service ecosystems by examining change processes at the actor level regarding redefining actors' activities and roles.

Actors' actions are influenced by their institutional logics, which enable and constrain actors' intentions, motivations, and behaviours. The behaviour of actors within a service ecosystem is guided by institutional arrangements, which are "interdependent assemblages of institutions that facilitate the coordination of activity in ecosystems" (Berthod, Helfen, and Sydow, 2019, p. 319). Moreover, actors create and modify elements of institutional logics through their actions and interactions for value creation. As a result, value co-creation is coordinated through actor-generated institutions and institutional logics. That is to say, institutions and institutional logics are the two elements that facilitate the value co-creation process within the structure of service ecosystems.

Institutional logics represent the rules which guide and coordinate actors' perceptions and actions (Geels, 2012). Institutional logics are further elaborated by Jaakkola and colleagues (2019, p. 501) as "a particular system of socially constructed interpretations of how actors can operate under perceived institutional contexts". Ideal types of institutional logics were presented by Thornton, Ocasio, and Lounsbury (2012), such as state logic, family logic, corporate logic, community logic, religion logic, market logic, and professional logic. For instance, state logic prioritises the interests of a nation and its citizens by ensuring fairness and accountability at each level of society (Guyader, Nansubuga, and Skill, 2021). As noted by Guyader, Nansubuga, and Skill (2021), some actors in stage logic adopted negotiation practices to balance public and private interests. In contrast, market logic pays attention to concepts such as return on investment and competition in the sense that organisations seek to enhance the efficiency and effectiveness of service offerings and maximise economic returns in a competitive yet unregulated field. Additionally, community logic refers to firms' organisation towards community needs (Aparicio et al., 2017).

While the extant literature acknowledges the existence of multiple institutional logics, relationships among these logics vary with regards to change processes in institutions. In the early years, scholars tended to focus on the outcomes resulting from overlaps regarding a dominant logic co-existing with other subordinate logics at the same time (Thornton and Ocasio, 1999). This type of relationship among multiple co-existing institutional logics suggests shifts in the dominance of multiple logics underlying institutional changes. Afterwards, the focus of the literature shifted towards an ongoing competition and tension among multiple institutional logics over a period of time, which results in a certain logic that prevails over other logics (Reay and Hinings, 2005).

More recently, studies have begun appreciating the co-existence of competing institutional logics over a period of time. Scholars found that each actor was guided by different and competing logics over time, which resulted in various actors adopting different practices to navigate co-existing institutional logics. Thornton, Ocasio, and Lounsbury (2012) categorised forms of change in field-level institutional logics into two themes regarding transformational change and developmental change.

Nevertheless, the results of multiple institutional logics in extant literature state that multiple institutional logics result in both positive and negative effects (Ingstrup, Aarikka-Stenroos, and Adlin, 2021). Some studies suggested that multiple logics facilitate innovation, while others indicated that tensions emerge from multiple logics. Since multiple institutions exist in a service ecosystem, it is suggested that actors' behaviour is influenced by various institutional logics in a service ecosystem. By adhering to expectations from various institutional logics, actors are able to cultivate resources and gain legitimacy. Nevertheless, recent studies have stressed the insufficient understanding of value co-creation from an institutional aspect (Ranjan and Read, 2021). Thus, the study adopts the lens of institutional logics to develop the second research question: What tensions arise throughout the evolution due to the multiple institutional logics of the actors within the ecosystem? Furthermore, the current study draws on the institutionalisation process of service innovation to develop an explanation regarding how actors' behaviour shapes institutions to influence multiple institutional logics in service ecosystems for service innovation.

2.5.2 Institutionalisation as the process of innovation in service ecosystems

Recently, scholars have been conceptualising the notion of service innovation as an institutionalised change in which actors integrate resources and co-create value through the re-configuration of actors, resources, and institutional arrangements (Edvardsson et

al., 2018). Technology is viewed as a dynamic resource in a service ecosystem, whereas innovation refers to actors collaboratively figuring out or developing new approaches to combine existing resources or incorporate new resources for value co-creation (Koskela-Huotari, Siltaloppi, and Vargo, 2016). According to Koskela-Huotari, Siltaloppi, and Vargo (2016), actors' actions are facilitated and limited through institutional changes. Hence, the institutional view of innovation enables researchers to explore practices and processes guiding value co-creation from a dynamic and ecosystem-related perspective.

The concept of institutional change serves as a key aspect of innovation, and it focuses on not only how actors' behaviour is influenced by institutions but how actors influence or change institutions (Vargo, Wieland, and Akaka, 2015). Conventionally, institutional change was demonstrated as a shift from one dominant logic to another. Nevertheless, recent studies have shown interest in the notion of co-existing institutional logics over a period of time (Koskela-Huotari, Siltaloppi, and Vargo, 2016). Drawing from the dynamic aspect of resource integration and value co-creation, the mutual influence between actor interaction and the reformation of institutions results in the notion of institutionalisation (Akaka, Vargo, and Wieland, 2017). Institutionalisation is defined as "the process by which various networks of actors become legitimised (or delegitimised) with respect to larger societal systems" (Chandler and Vargo, 2011, p. 44). It offers a convergent approach for various aspects of innovation by using the constitution of the ongoing maintenance, disruption, and change of institutions to understand the service innovation process. Specifically, the ongoing maintenance, disruption, and change of institutions are influenced by actors' purposive actions, which is understood as institutional work (Vargo, Wieland, and Akaka, 2015).

The development process of service innovation is viewed as a process of institutionalisation (Jaakkola, Aarikka-Stenroos, and Ritala, 2019). With multiple institutional logics existing in ecosystems, they affect the way actors perceive service innovation. Subsequently, actors' behaviour is influenced by institutional logics in response to changes in service ecosystems. For instance, Lacerda, Robaski, and Lopes (2020) noted that the development of technology resulted in changes in service ecosystems that drove changes in the legal framework to regulate financial activities. Therefore, institutionalisation is the process of competing institutional logics seeking legitimacy in the process of service innovation, where change occurs in multiple institutional logics as actors re-shape institutions to align with requirements for innovation (Jaakkola, Aarikka-Stenroos, and Ritala, 2019).

The theoretical lens of institutional logics views value platforms in service ecosystems from a dynamic aspect. Scholars urge the concept of institutional logics to be viewed as a dynamic phenomenon rather than a static perception of value. As actors are involved in resource integration during the processes of value co-creation, their activities and interactions are shaped by institutional logics (Colurcio, Caridà, and Edvardsson, 2017). In other words, actors' activities and interactions are shaped by institutional logics as they are involved in the evolution of value platforms.

However, an in-depth understanding has been suggested as necessary by scholars to explore the development process of innovation from the processual aspect of institutionalisation (Koskela-Huotari, Siltaloppi, and Vargo, 2016). Moreover, there is insufficient understanding regarding the whole process of service innovation and how it is institutionalised in the service ecosystem (Jaakkola, Aarikka-Stenroos, and Ritala, 2019). Hence, the study draws on the conceptualisation of institutionalisation process of service innovation process to develop the third research question: How do actors navigate multiple institutional logics as value platforms evolve?

2.5.3 Tensions resulting from co-existing institutional logics in service ecosystems

Previous studies suggested that tensions become salient to actors through individual sensemaking and relational dynamics or through environmental conditions of scarcity, plurality, and change (Smith and Lewis, 2011). Scarcity focuses on limited resources that drive tensions emerging from conflicting demands for resources. Quicker paced technology is a catalyst for new competing demands or can amplify existing competing demands (Smith and Tracey, 2016). Change brings a temporal and dynamic aspect to tension. Moreover, multiple actors with different competing demands are encapsulated in the phenomenon of plurality.

The notion of value platforms draws on the concept of tensions resulting from multiple institutional logics, highlighting actors' joint collaboration on tensions of co-existing institutional logics occurring in service ecosystems (Haase and Kleinaltenkamp, 2011). Each actor is influenced by multiple institutional logics during the process of value co-creation. By adhering to expectations from the shared institutional logics among actors, actors gain legitimacy and cultivate resources (Smith and Tracey, 2016). Legitimacy is defined by Suchman (1995, p. 574) as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate". However, institutional complexity arises when actors are confronted by multiple and incompatible institutional logics, which shape organisational actions and outcomes simultaneously (Baumann-

Pauly, Scherer, and Palazzo, 2016). The literature of institutional complexity has explored how individuals and organisations manage tensions and conflicts stemming from multiple or competing institutional logics (Baumann-Pauly, Scherer, and Palazzo, 2016; Lounsbury et al., 2021). Previous studies tend to focus on discussing institutional complexity as multiple, co-existing, often competing institutional logics (Reay et al., 2017). The literature of institutional logics moves the institutional literature towards exploring how tensions resulting from multiple logics become a driver for continuing institutional change (Lounsbury et al., 2021). Such a notion provides an explanation for service ecosystems by introducing the existence of multiple institutional logics which lead to tensions at the ecosystem level.

These competing institutional logics cause tensions that drive institutional change and transformation, namely innovation. As multiple actors interact and integrate resources within value platforms in a service ecosystem to co-create value, tensions may emerge since actors may not possess the same interests (Edvardsson et al., 2014). Specifically, Tóth et al. (2018, p. 34) further conceptualised tension as "the discomfort generated by ambiguity that can have various sources, such as contradictory and unclear communications, lack of communication, lack of sufficient planning, and incongruity between actors' aims". That is to say, the tensions between competing institutional logics serve as creative tensions, which push for innovative solutions.

Change occurs during the development process of service innovation, and it is a complicated and uncertain process that provokes new opportunities for actors to deal with tensions (Smith and Lewis, 2011). For example, tension can generate positive implications such as encouraging actors' motivation in innovation and idea generation (Hutter et al., 2011; Smith et al., 2017). Legitimation strategies have to be implemented in order to balance such incompatible and conflicting demands. Since actors are in an environment with pluralistic, heterogeneous expectations, and multiple values, they have to take joint actions to ensure legitimacy, even though some actors do not fully agree with the logic that drives the action. The process by which competing institutional logics seek to legitimate themselves refers to institutionalisation. Therefore, tensions become an important element that shapes the emergence and evolution of value platforms.

Actors with inherent tensions are influenced by multiple institutional logics during the process of value co-creation (Baumann-Pauly, Scherer, and Palazzo, 2016). As multiple institutional logics co-exist, it is suggested that actors implement practices that secure a certain level of legitimacy within their limitations (Lacerda, Robaski, and Lopes,

2020). Reay and Hinings (2009) identified four mechanisms which enabled actors to navigate two conflicting institutional logics by working collaboratively with other actors. Yet, they did not particularly focus on the innovation aspect. More recent studies have adopted the institutional logics perspective to identify the tensions resulting from the co-existing institutional logics and the navigating mechanisms adopted by actors (Sadeh and Zilber, 2019). However, the processual aspect between tensions resulting from co-existing institutional logics and navigating mechanisms applied by actors remains unclear.

A wide range of navigating practices adopted by individuals and organisations were identified, such as compartmentalising, blending, and balancing. Nevertheless, little research has explored navigating mechanisms for the co-existence of multiple institutional logics from a processual and ecosystems aspect. Although the extant literature has focused on identifying divergent types of tensions and practices to overcome and manage them (Andriopoulos and Lewis, 2009; Jarvenpaa and Wernick, 2011; Vollmer, 2015), the understanding of these navigating practices in the tensions literature remains at a conceptual level. Little is known regarding how tensions emerge and are managed in the innovation processes from a theoretical perspective (Jamie et al., 2016). Furthermore, it is noteworthy that limited research empirically explores how these tensions are navigated by multiple actors at the operational level (Smith and Beretta, 2020).

2.6 Conclusion of Literature Review

This chapter engages with the debates in extant studies around concepts of value co-creation in service ecosystems and the processual aspect of service innovation. As advanced technologies are revolutionising the role of services across sectors, this draws scholars' attention to the dynamic and interrelated relationships among actors with regard to value co-creation and collaboration. Recent studies have become interested in exploring service innovation from a processual and context-dependent perspective of value co-creation as actors collaborate with external actors for the development of service innovation in service ecosystems (Edvardsson et al., 2018). However, it is noteworthy that the development process of service innovation in service ecosystems is still nascent as most studies explore the process of successful innovations (Aal et al., 2016). Moreover, the emergence of service ecosystems in combination with the process of service innovation opens an arena for the processual focus on how value is co-created among divergent actors in ecosystems over time.

In addition, empirical studies have shifted the interests of value co-creation from traditional dyadic relationships to ecosystems formed by diverse actors. Nonetheless, empirical studies have been criticised for exploring service ecosystems from particular actors' viewpoints rather than the ecosystem as a whole. In other words, scholars are calling for the study of service ecosystems by investigating diverse actors in parallel, such as public agents, organisations, intermediaries, and customers. More specifically, the understanding of how public agents influence the development of service innovation remains limited since some studies argued that public actors act as facilitators, while others suggested the role of inhibitors. Consequently, this leads to the introduction of a platform-based view of service innovation in service ecosystems. By reviewing the evolution of various platform notions, the current research draws on the notion of value platforms to place the focus on a value-centric and process-oriented view of how value is co-created in service ecosystems in the context of service innovation processes.

Future research should investigate the evolution of value platforms in service ecosystems to explore how value is co-created among actors and how the process of service innovation is managed by divergent actors over time. Hence, this study adopted the lens of institutional logics to theorise the understanding of how value platforms evolve in service ecosystems. In addition, value co-creation in ecosystems should take the tensions aspect into consideration since diverse actors may have different goals and interests which result in tensions. Nevertheless, the existing literature of service ecosystems has been criticised for mainly exploring value co-creation from positive aspects (Ranjan and Read, 2021). In this thesis, the tensions aspect in the evolution of value platforms is examined to understand how the co-existence of multiple institutional logics interplay and how they are navigated by actors as value platforms evolve. To investigate the research gaps identified in this chapter, the following chapter will demonstrate a suitable methodology designed for the identified research objectives.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This research focuses on investigating the mechanisms of actor interaction in platform-based service innovation. The research questions are: 1) How do value platforms embedded in service ecosystems evolve? 2) What tensions arise throughout the evolution due to the multiple institutional logics of the actors within the ecosystem? 3) How do actors navigate multiple institutional logics as value platforms evolve? In this chapter, the research design and the organisation of the chapter are presented in order to address resource-related activities among actors in the process of telematics insurance service innovation. A qualitative research approach with a single case-study design is adopted in the study to explore the evolution of value platforms in the service innovation process.

The current study follows the definition of mechanisms by Perks et al. (2017, p.106–107) as "an overarching assembly of practices that produces an effect on the value platform development, which is not inherent in any one of the practices alone". In other words, this research attempts to unfold relationships and tensions which emerge in the evolution of value platforms through resource-related activities among actors in service ecosystems. From Ford et al.'s (2008) viewpoint, all the actors concurrently interact with each other in an actor network. On the one hand, the connections between interaction processes will cause adjustments of resources and activities across institutions. On the other hand, the adjustments made by the actors also shape the interactions correspondingly. As a result, interactions represent a mutual aspect in which actors associate their activities and resources with each other, and other actors' actions also have an impact on the actors' decisions.

3.2 Philosophical Assumptions

A major ontological question of the study refers to 'what is the nature of value platform evolution?', while a key epistemological question of the study is about 'how can the knowledge of value platform evolution be known?'. From the perspective of critical realism, all knowledge is limited and imperfect, since all theories have taken a certain standpoint to form a view (Maxwell and Mittapalli, 2015). Critical realism assumes that an objective reality of value platform evolution exists independently of the researcher's perceptions and beliefs, while the researcher's understanding of it is through a

subjective perspective of human cultural norms, values, and social processes (Meyer and Lunnay, 2013; Hoddy, 2019).

Since reality is stratified from a critical realist ontological assumption, it means that reality exists independently of participants' ability to experience it (Pawson and Tilley, 1997). According to Easton (2009) and Williams and Karahanna (2013), the empirical domain of reality refers to where observable events are generated and experienced. The actual domain of reality refers to events activated by the causal power inherent in independent entities. The real domain contains entities which are independent of reality, with their causal power being activated in a particular context. The analysis of causation enables the investigation of the generation of events and regularities in these three domains of reality (Astbury and Leeuw, 2010). The researcher viewed the phenomenon of value platform evolution through a critical realist ontological stance, which seeks to uncover the mechanisms that underlie resource-related activities in ecosystems to develop service innovation over time. Critical realism brings a more united view regarding how actors interact with each other in ecosystems within the process of service innovation (Andersen, Dubois, and Lind, 2018).

There is only one reality for the evolution of the development process of service innovation. To explain such process of service innovation, critical realism offers an explanatory approach. The process of service innovation does not happen in a vacuum; instead, it can only be observed through participants' perceptions and experiences of it. From a critical realist view, the existence of ecosystems is dependent on actors' activities and cannot be separated from the human components that are involved in it. An individual's understanding of actor interaction and service exchange for service innovation is through their observations, experiments, and behaviour in the process of service innovation (Sousa, 2010). Therefore, the focus of this research lies in resource-related activities in ecosystems over time. Due to the complex and dynamic nature of activities among actors in ecosystems in the process of service innovation, critical realism has been adopted as the ontological stance (Easton, 1995).

Critical realist ontology pays attention to what causes events rather than the events per se, which is suitable for exploring activities of actor interaction and resource-related activities in the process of service innovation. In other words, the concept of mechanisms in critical realist ontology draws attention to the underlying mechanisms which result in the evolution of value platforms and how contexts affect the manifestation of mechanisms (Eastwood, Jalaludin, and Kemp, 2014). The evolution of value platforms in service ecosystems during the process of service innovation consists

of actors, institutions, and mechanisms that are inseparable from the society. As a result, interpretive epistemology was applied to investigate actors' behaviour and experiences, institutions, and mechanisms beyond actors' understanding, which formed the knowledge of such reality (Vincent and O'Mahoney, 2018).

3.3 Research Design

The purpose of this study is to investigate resource-related activities in service ecosystems during the process of platform-based service innovation. The philosophical positions identified in the previous section have led us to the design phase of the research. In this chapter, the rationale for using a qualitative exploratory research design is explained, the justification of using a single-case-study approach with two embedded cases is provided, and the reason for implementing process research is given. Additionally, several approaches were adopted to strengthen the quality of this study. For example, primary data such as interviews and visual drawings were triangulated with archival documents to reduce retroductive bias and improve reliability in process research (Villani and Lechner, 2021).

3.3.1 Exploratory research approach

The exploratory research approach was selected based on the nature of the research objectives in this study, which is to untangle resource-related activities amongst actors within a service ecosystem (Henneberg, Mouzas, and Naudé, 2006). Furthermore, service ecosystems emphasise the feature of the changing roles of actors and the shifting patterns of competition and collaboration, which underline the importance of actors and their relationships (Gawer, 2014). Nevertheless, Storbacka et al. (2016) pointed out the issue that value co-creation is hard to observe or study empirically, while interactions between actors and integration of resources are observable and could be designed and managed during the data collection phase. Consequently, the researcher carried out an explorative research design by conducting a qualitative study, which is suitable for studying dynamic interactions between multiple actors that have been involved in the collaboration process of service innovation (Creswell and Creswell, 2018).

Storbacka and colleagues (2016) stated that actors generate interactions by engaging in service-for-service exchange, which results in resource integration that facilitates value co-creation. They demonstrated that actors represent both social actors, such as humans, and collections of humans, such as organisations. Actors become an essential element since organisations collaborate with external parties to achieve service innovation through the interactions between various vital individuals within each actor. As a result,

actors form actor-to-actor networks within a service ecosystem, which further bring in the value platform concept.

3.3.2 Process-based single-case study

A process-based single-case study enables researchers to capture the ongoing resource-related activities for the development of telematics insurance services over time (Andersen, Dubois, and Lind, 2018). The case study approach enables researchers to explore the complexities and evolution of the value-driving mechanisms and processes during the evolution of value platforms (Easton, 2010; Aarikka-Stenroos, Sandberg, and Lehtimäki, 2014). The process-based single-case study has been suggested to allow researchers to capture a processual aspect of collaboration amongst diverse actors in an ecosystem and collect multiple sources of data from various actors and different functions within an organisation (Mouzas, Henneberg, and Naudé, 2008). Recent processual studies also show an increasing interest in applying case study design (Piekkari, Plakoyiannaki, and Welch, 2010).

According to Yin (2017), the case study research method allows scholars to study behavioural events without intervening participants, and it is particularly suitable for 'how' and 'why' questions. That is to say, the relationships among multiple actors in ecosystem studies are especially suitable for using a case study design since researchers have little control over the contexts (Johnston, Leach, and Liu, 1999). Additionally, Yin (2017) argued that case study research offers researchers a way to explore the complexity of social phenomena, such as the evolution of value platforms, in order to obtain an in-depth and holistic understanding of a real-world situation. Since the evolution of value platforms and the context are intertwined with each other and have no clear boundaries, it can neither be studied out of its natural setting nor be easily quantified (Johnston, Leach, and Liu, 1999).

The case study approach aims to define cases and to investigate the phenomenon of researchers' interest in a particular context setting rather than to analyse the cases themselves (Mouzas, Henneberg, and Naudé, 2008; Gustafsson, 2017). Recent processual studies also show an increasing interest regarding applying case study design (Piekkari, Plakoyiannaki, and Welch, 2010; Gustafsson, 2017). Each value platform helps the researcher draw boundaries separating elements within or outside an embedded case. The process of service innovation refers to the whole process from the initiation phase, such as idea generation to development to the ongoing maintenance after it has been launched to the market, since service offerings continuously operate until service innovation is terminated.

Randhawa and Scerri (2015) illustrated that the service innovation concept brings attention to project management teams and inter-organisational collaboration, which emphasise the importance of coordination amongst actors within a service innovation project. They indicated that the process of value co-creation in service innovation consists of service employees' interactions with other knowledge workers across an interrelated network of actors. Moreover, they stressed the managerial and organisational change in services resulting from the dynamic interactions among technological and human systems. Therefore, real-world value platform cases are required along with contextual settings to explore actor interaction and network activities during the process of developing service innovation (Mouzas, Henneberg, and Naudé, 2008).

Through the implementation of the case study design, the theoretical concepts associated with value platforms, service innovation, and value co-creation will be empirically clarified (Yin, 2017). Although the case study research is considered an appropriate approach to conduct exploratory research, it still has drawbacks like any other method. Many scholars have criticised it for lacking methodological rigour and objectivity (Johnston, Leach, and Liu, 1999). Yin (2017) further emphasised that case studies enable the generalisation of theoretical propositions rather than that of the entire populations.

In this study, an embedded case study approach was applied to investigate resource-related activities experienced or observed by diverse actors. Specifically, a single embedded case study took the form of a telematics ecosystem with two embedded value platforms, which were formed by multiple actors (Scholz and Tietje, 2002). Actors acted as the sub-units within an ecosystem, which were investigated in the research (Mills, Durepos, and Wiebe, 2010). This enabled the researcher to obtain a more holistic understanding of the single case through an extensive analysis of a range of actors involved in the telematics ecosystem (Simmonds et al., 2021). Since diverse actors constituted the telematics ecosystem, the embedded case design unravelled a multi-level nature of the ecosystem by analysing multiple actors constituting each value platform (Yin, 2003).

3.3.3 Unit of analysis

Activities related to the development of telematics insurance services were the units of analysis. The study views the process of service innovation in an ecosystem setting, focusing on the activities of loosely connected actors dedicated to the development of

a certain type of novel service (Snehota and Hakansson, 1995). The definition of a case in this research is a fundamental element that needs to be clarified when a case study design is chosen. Since the current research focuses on actor interaction and resource integration aspects within the collaborative service innovation projects, an ecosystem aspect is adopted to unravel the concept of value platforms. Due to the multiplex nature of innovation, multiple levels of concepts and relationships are recommended to be analysed (Ritala, Schneider, and Michailova, 2020). Moreover, Gupta, Tesluk, and Taylor (2007) highlighted that organisational subunits and individuals are embedded in both an interfirm and an intra-firm network. Business networks are the constitution of interactions among the inter-connected actors, which then interact with other connected actors. However, these interactions are conducted through the execution of managers and individuals, which means the individuals are the primary drivers of network processes who act as agents for companies (Tsoukas and Chia, 2003).

Actor-level analysis was conducted to explore diverse actors' perceptions of value platform evolution in a service ecosystem. As mechanisms and interactions can happen at different levels during the innovation process, other sub-units of analysis such as individuals and functions within each network actor were studied (Perks, 2001). After multiple levels of analysis were conducted, the final level of analysis, which refers to each embedded case, was drawn to present the findings (Virlée, Hammedi, and Parida, 2015). Value platforms provide the researcher with clear boundaries, which define actors that are within or outside of a collaboration network that aims to develop a telematics insurance service.

3.3.4 Context of research

Ramos and Ford (2013) indicated that interactions and relationships must be studied within given business contexts to understand their workings during the process of service innovation. They stressed that the time element and contextuality are two components for investigating project networks. Due to the nature of services, it is suggested that more diversified service contexts are adopted for organising service innovation to explore innovative activities in services (Randhawa and Scerri, 2015). Specifically, Randhawa and Scerri (2015) described that the financial service sector, including the insurance industry, is highly knowledge-intensive, highly regulated, and more drawn to implement advanced information technologies into their business models.

The insurance sector is the context of the study. Due to factors such as the evolution of digitalisation, disruptive innovation, and threats from new players entering the sector,

the insurance industry has started to substantially change its way of doing business and creating new business models. Hence, players within the insurance sector and other actors from diverse industries have to redeploy their resources and react to the flow of change to achieve service innovation. This echoes Edvardsson and Tronvoll's (2013) viewpoint that resource integration mechanisms have to be designed within the service system to encourage value co-creators to amplify service innovation. They further stated that as the system concept of services focuses on resource integration and service exchange between actors, a service ecosystem is perceived as a social context; consequently, value is co-created within a collective social context.

As insurance managers shift towards utilising their external connections and resources, they cannot implement their previous experiences into new strategies that demand dealing with government regulations while having to work with their external business collaborators. However, these collaboration strategies have brought new challenges for the management teams of such firms because insurance companies are not used to the formation of a service ecosystem for service innovation. Additionally, actors from different backgrounds have diverse aims that may not always align with those of the insurers. Therefore, tensions will emerge from the mismatched goals between actors (Koskela-Huotari et al., 2016). For instance, technology companies tend to place most of their attention on speed-to-market, whereas insurers have to not only comply with regulations but develop service innovation. Hence, managers have to evaluate and adjust their practices concerning both internal employees and external partners in a changing environment and over time. Based on the above discussion, a service ecosystem of telematics insurance services with two embedded value platforms, which involve collaboration between insurers and diverse actors, is set as the case of the study.

Very recently, telematics insurance, which is also called usage-based insurance (UBI), has been introduced to the market as a solution whereby technologies are utilised in the motor insurance industry to achieve novel service innovation. Insurers incorporate advanced technologies, such as cellular, GPS, and Internet of Things (IoT) into black boxes to calculate the insurance premiums based on driving behaviour rather than the driver's demographic information. To develop telematics insurance projects, insurers partner with other external actors such as technology companies, start-ups, universities, and research centres that do not originally reside in the insurance industry. This forms networks of telematics insurance service innovation. Moreover, the attitudes of insurance regulators towards innovation and the decisions regulators make have a notable impact on the direction of technological development in the insurance sector.

Therefore, the above discussion has reflected a service ecosystem aspect of developing telematics insurance.

3.4 Research Methods

Research methods serve as tools to employ the qualitative case study design so that the complexity of the selected telematics projects can be unravelled by the researchers (Gustafsson, 2017). Participants, who play different roles in an ecosystem, have different viewpoints on the development processes of telematics insurance services. As encouraged by Seidman (2006), a series of interviews with every participant allows researchers to study people's behaviour and comprehend participants' experiences and their surroundings in the context of telematics insurance services projects. This study adopted a phased-interview programme to collect data, and more details of how the two-phased data collection was conducted are demonstrated in Section 3.5.4. In this research, visual methods were incorporated within the interview processes to support the researcher's interpretations (Roulston and Choi, 2018). Once the participant completed the drawings, they were asked to state and explain what they had drawn. Such narrative data was valuable to enrich the data collected through interviews (Tubaro, Ryan, and D'Angelo, 2016; Jaspersen and Stein, 2019). Participant-generated drawings provided interviewees with a chance to depict their surroundings, which are sometimes challenging to describe verbally, and to recall their memories and enable interviewees to structure their own reality (Guillemin and Drew, 2010; Berends, 2011). In other words, drawing network pictures and critical incidents shifted the positions of participants and the researcher by providing participants with certain autonomy to illustrate their perceived actor networks and to choose critical incidents on their own (Patterson, Markey, and Somers, 2012).

In order to reduce interviewees' anxiety, as drawing may be a relatively unfamiliar approach for certain people, the researcher ensured that all interviewees were informed about the drawing sessions when contacting and sending the overview of the interview questions to the participants. The drawing activities enhanced rapport between the interviewer and interviewees during the data collection by providing a common topic in the conversation and by keeping the conversation going, which resonates with Jaspersen and Stein's (2019) statement. Eventually, the primary data of the interviews, network pictures, and critical incidents were integrated with the secondary data collected from news, annual reports of the organisations, and any documents provided by the participants.

Since value is co-created through resource integration by multiple actors within an ecosystem, the perceived values varied between each actor (Vargo and Lusch, 2016). Therefore, each participant's perception of value and network was collected separately in order to unravel the potential tensions amongst different actors (Koskela-Huotari et al., 2016). The chosen research methods for the qualitative single-case study design of the research are elaborated in the following sections.

3.4.1 Process research of actors in a value platform

The study focuses on discovering the content and shape of relationships among organisations regarding actors, resources, and activities by adopting a process perspective on qualitative case studies. This helps unravel the temporal evolution and emergence of interactions and relationships (Easton, 1995; Håkansson and Ford, 2002). However, it is noteworthy that process-oriented research approaches have rarely been critically investigated regarding their methodological characteristics and challenges (Vandenbussche, Edelenbos, and Eshuis, 2020). Although process research is acknowledged as an important qualitative research method for strategic management and organisational studies, Witell et al. (2015) criticised that service innovation literature often neglects the development aspect of services and mostly implements a cross-sectional approach. Moreover, scarce attention has been paid by network researchers to the methodologies of qualitative network research (Halinen and Mainela, 2013). The nature of process research has resulted in various challenges despite the fruitful and in-depth understanding it could provide. Bizzi and Langley (2012) discussed the methodological choices of process research, such as temporal orientation, unit of analysis, sampling, data sources, data analysis and interpretation, and conceptual products. Also, due to the complexity of the process, Langley (1999) presented seven strategies of process theorising for researchers to analyse process data.

The current study explored the continuing interactions, joint operations, and resource flows among the interdependent actors in the two chosen cases from a processual perspective (Bizzi and Langley, 2012). Semi-structured interviews were conducted individually on sites with managers and the key individuals in the organisations and institutions, which are either directly or indirectly involved in the value platforms of developing telematics insurance services. Additionally, actors who were indirectly involved in the development process of telematics insurance services but had an impact on other actors' behaviour in the development process were also interviewed by the researcher. For instance, the regulator in the insurance sector, and the academic consultant of an insurance research institution.

3.4.2 Critical incident technique

Furthermore, actors are found to influence the initiation of the collaboration process in a value platform according to the data of critical incidents. Since the purpose of this research is to scrutinise the process of service innovation, the critical incident technique (CIT) was used as an investigation tool for researchers to focus on the phenomenon of value co-creation within the service innovation process over time (Gremler, 2004). CIT is suggested by Hughes (2007) for the vibrant and contextual data it generates through the reflection of participants' personal experiences and observations. The CIT method was initially proposed by Flanagan (1954) to the social sciences in order to study human behaviour. The flexible nature of CIT was utilised to shift the focus from participants answering questions designed by the researcher to participants structuring activities that occur during the development of telematics insurance services based on their perspectives.

Later, CIT was further developed in the area of business development and entrepreneurship. Chell (2004, p. 48) described the CIT method as "a qualitative interview procedure, which facilitates the investigation of significant occurrences (event, incidents, processes or issues), identified by the respondent, the way they are managed, and the outcomes in terms of perceived effects". According to the above statements, the CIT method was considered a suitable approach to disentangle the details of service innovation processes. This technique allowed scholars to get closer to the way actors interact with others to co-create value in a service ecosystem in platform-based service innovation (Chell, 2004). CIT enabled the interviewees to share their stories and to elaborate on the significance of the incidents in a given context, which is suitable for studying the developing processes of telematics insurance services (DeMarrais and Lapan, 2003). It allowed researchers to capture vivid details and useful information about the service innovation process from the interviewees (Gremler, 2004). The study has referred to the publication of Manser et al. (2016) to design the interview questions for critical incidents. Participants were asked to recall and identify the critical events within the development process of telematics insurance services.

During the interviews, the researcher provided the participants with coloured pens and A3 paper with a brief printed guide of CIT section to obtain details of each incident. Interviewees were asked to draw a timeline with the identified critical incidents that occurred in the development process of telematics insurance services. Afterwards, participants were asked to further illustrate their drawings and to explain each critical incident regarding when it happened, what happened, the reasons leading to the incident, and what it resulted in, who was involved, and how the interviewee managed it. In this

study, participants typically spent five to ten minutes drawing a timeline to identify critical incidents in the development process of telematics insurance services.

3.4.3 Network pictures as a research tool

Network pictures helped draw boundaries around the value platform. Several actors were found to have an impact on each value platform of telematics insurance services based on network pictures. For instance, the participation of the insurance regulator, insurance agents, and insurance competitors demonstrated the dynamic aspect of the value platform. The researcher also realised that the drawing sessions helped to reduce the power differences between the interviewer and the interviewees. Moreover, the legal system was discovered to influence the way innovations are shaped in an industry. When the rules of developing innovations were established in advance, it created certain limitations for innovations.

Investigating networks empowered the understanding of activities that are associated with companies' management. Ramos (2008) stressed that members within organisations make decisions according to the company's strategies. Moreover, network activities are determined by actors' control over resources and their exchange processes. Namely, all the decisions and interactions amongst actors are the subjective outcomes made by actors, which are independent of each other. Hence, it is crucial to obtain different actors' perceptions of the value platform they are involved in by using network pictures.

Ford et al. (2002) illustrated that network pictures provide a foundation for these actors to analyse situations and to take actions since each actor within the network has its own picture of the content, features, and scope of the network. The network picture is suggested as a research tool for qualitative case studies as this approach enables scholars to study value platforms from a variety of network actors' viewpoints and also from a processual aspect (Anderson, Hakansson, and Johanson, 1994; Henneberg, Mouzas, and Naudé, 2006). Also, it offers a systematic approach for researchers to generate richer data.

Ramos and Ford (2011) stated that the network pictures approach allows participants to reflect on their surroundings, which sometimes are challenging to describe verbally. Additionally, it helps interviewees to recall their memories and structure their own reality (Guillemin and Drew, 2010; Berends, 2011). In other words, no single actor can see the entire collaboration network due to the subjectivity of people, which highlights the importance of understanding each participant's network picture (Ramos and Ford,

2013). Therefore, the researcher had to further interpret and illustrate the two value platforms based on all the collected verbal and visual data.

Network pictures were shaped both internally and externally. On the one hand, network pictures presented by different participants varied based on their personal position, relationships, and experiences within the network each participant perceived. On the other hand, the network pictures were confined to the participants' knowledge and influenced by the uncertainties and issues they have encountered. Kaartemo, Makkonen, and Olkkonen (2015, p. 5) highlighted that network pictures could deepen the understanding of the "dynamics between individual network actors, their intentions and actions and the structural and processual elements of their surrounding business networks". This phenomenon reflects that the decisions and strategies emerged as a dynamic process within value platforms (Tikkanen and Halinen, 2003).

When collecting the data of network pictures, the researcher applied a drawing section and semi-structured interviews to investigate the aspects of actors, resources, and activities within the service ecosystem of telematics insurance service innovation. In this research, participants typically spent 10 minutes completing network pictures. The guideline for the network picture drawing section was developed based on Ramos and Ford's (2011) publication by firstly asking the interviewees to draw a network picture based on their individual perception of the actor network developing the telematics insurance service they participated in. Afterwards, an A3 answer sheet and coloured pens were distributed to the participant with the network picture drawing instructions printed on the paper. Interviewees were asked to "draw a picture of the departments, organisations, institutions, and entities that are involved in the development process of telematics insurance services". Participants were informed that there was no correct answer for drawing network pictures to give them some degree of autonomy to illustrate the network pictures in their minds. Moreover, they were told to freely use different kinds of symbols and colours to present whatever they felt was most appropriate so that no restrictions would limit their thoughts.

Although Ramos (2008) suggested that visual data collection approaches should be applied before verbal data collection methods, since interviewees tend to feel more comfortable with the situation and the data collected will be more fruitful. Nevertheless, the network pictures approach was adopted at the end of each interview in this study as the researcher noticed that participants were not familiar with the incorporation of drawing sessions in interviews. A follow-up discussion was then carried out after the participant drew the network picture so that participants could reflect on what he or she

said during the interview. The researcher asked the participant to explain what he or she has drawn in the network picture. This was followed by a series of interview questions about the network picture in different aspects, such as identifying network actors, the formation of the network, the development process of the project, and tensions that emerged within the firm and between actors. Then the researcher probed questions that are related to the roles each actor plays and the interactions between different actors. This enabled participants to double check the drawings and recall their memories again.

3.5 Data Collection

3.5.1 Sampling

In this research, each selected telematics insurance service represents a value platform of telematics insurance. The theoretical propositions of value platforms were adopted to select cases of the study, which multiple organisations, institutions, and the insurance regulator jointly interact and work with to deliver the telematics products to the market. The selection criteria were initially defined according to the theoretical definition of value platforms, in order to choose appropriate cases for investigation (Wood, Reefke, and Breidbach, 2012; Miles, Huberman, and Saldana, 2014; Perks et al., 2017). The process of embedded case selection and sampling is illustrated in Figure 3. While using theoretical sampling, the choices of cases and participants were determined by the conceptual question (Miles, Huberman, and Saldana, 2014). Having selection criteria ensured appropriately representative cases were selected to explore the value platform concept.

Telematics insurance services in which multiple actors collaborated and which had been launched to the insurance market for a relatively long period, or ones that had issued a higher number of telematics insurance policies, were given priority due to the more abundant data they could provide for the study. Taiwan was chosen as the country site since its annual cost of motor insurance is relatively low, ranging from £30 to £750. Moreover, telematics services were launched relatively late to the market in 2016, while many insurers in developed countries had introduced these from 2010.

To effectively conduct case studies and select value platforms, a two-stage criterion-based theoretical sampling approach was implemented. At the first stage of theoretical sampling, the insurance industry was selected as the target sector. Within the insurance industry, telematics insurance services were considered as value platforms where actors co-create value to accomplish the development and improvement of telematics insurance services. The telematics insurance services that collaborate with external

parties and customers were identified through the information gathered from the Internet and news. The potential targets of embedded cases in the Taiwanese markets were the ones which had successfully launched in the country and were relatively well-developed in order to provide fruitful and in-depth information to the researcher.

At the second stage of theoretical sampling, the potential case companies were identified from online information and through the guidance of local academics in the insurance department. Once the potential projects were identified, the researcher started getting initial contacts from each insurer. The researcher accessed initial contacts through the Department of Risk Management and Insurance in a Taiwanese university since the academics in the department had maintained a good relationship with the insurance industry, and a substantial number of alumni in the Taiwanese insurance industry graduated from the department. Additionally, the researcher's personal contacts also facilitated the process of obtaining access to actors. Eventually, the researcher managed to contact and successfully obtain access to two telematics insurance services in Taiwan. To protect the identities of the projects, organisations, and participants within this research, the researcher re-named the first telematics insurance project as Value platform T; the second project as Value platform G. The participants, organisations, and institutions involved in the projects are given specific corresponding codes to conduct data analysis.

Stage 1 Selection of embedded cases

1. Develop the criteria of selecting value platforms (theoretical sampling)
2. Filter the appropriateness of the value platforms through news and media based on the criteria
3. Determine the candidate value platforms
4. Getting contact information of the key actors in value platforms from the Department of Risk Management and Insurance at an university and from the researcher's personal contacts

Stage 2 Obtain access and conduct data collection

1. Obtain access from the insurance companies and relevant participants.
2. Finalise the selected value platforms
3. Conduct interviews with insurance companies.
4. Used snowball sampling to reach and obtain access from other actors which were involved in the development process of telematics insurance services
5. Conduct interviews with other actors identified through snowball sampling

Figure 3. The two-stage process of case selection and sampling.

3.5.2 Identification of actors and selection of participants

To obtain an in-depth understanding of service innovation, Randhawa and Scerri (2015) highlighted the imperative role of project management teams, which are responsible for developing and deploying service innovation by providing collaborative and flexible knowledge exchange. As telematics project management teams were in charge of coordination amongst actors, the teams helped the researcher identify the relevant actors at the beginning because they possessed a more holistic view of the project compared with other actors who were peripheral to the actor network. Actors who were involved in telematics service innovation and key individuals offered beneficial information for the study. Consequently, the starting point for the research to approach each project was the project management team of telematics insurance services in each insurance company, since telematics insurance services were the output launched by the insurers. After conducting interviews with the project management teams, the researcher implemented the snowball sampling technique by asking the insurance companies to refer her to potentially relevant actors for obtaining access. The procedural definition of snowball sampling is "when the researcher accesses informants through the contact information that is provided by other informants" (Noy, 2008, p. 300). In this way, the insurance companies that play a crucial role in the development process of telematics insurance services help the researcher identify and provide contact information for the researcher to further access the participants in telematics development.

Corresponding participants such as executives, managers, employees, and specialists, who were or had been involved in the projects, were further identified to study the phenomenon of value platform evolution since they participated in the development process of telematics insurance services. Then, the potential participants in the projects were emailed an invitation to participate in the study. Table 2 lists the interviewees within the two cases of telematics insurance. The researcher followed the University of Nottingham's Code of Research Conduct and Research Ethics to ensure the highest standards of performance and ethical conduct. The names of telematics projects, organisations, and participants were modified to maintain confidentiality, and the collected data were stored in encrypted folders with passwords. Moreover, the anonymity of research participants was guaranteed, and personal and organisational information remain anonymous.

Table 2. Overview of interview participants

Actors in the ecosystem	Department	Informant role	Acronym of informant	Interview length** (mins)	Network pictures ***	Critical incidents ***
Insurance regulator*	-	Staff	R1	180	X	X
Insurance agent A*	-	CEO	IA	180	X	X
Insurance Research Institution*	-	Research consultant	C1	40	X	X
Insurer T	Personal Insurance	Original Project Manager	TC	70	X	X
		Associate Manager	T4	80	V	V
		Associate Vice President	T7	83+77	V	V
		Vice President	T2	90+32	V	V
		Deputy Manager	T1	66+60	V	V
		Coordinator	T8	60	V	X
	IT	Section Chief	T3	136+85	V	V
	Digital Marketing	Manager	T5	75+80	V	X
	Actuarial Planning	Deputy Manager	T10	120+92	V	V
	Business Line	Business Manager	T6	180+60	V	V
	Business Line	Business Section Chief	T9	120+50	V	X
Insurer G	Loss and Prevention	Manager	G1	90+50	V	V
	Motor Insurance	Staff	G2	90+60	V	V
	Motor Insurance	Section Chief	G3	72	V	X
Tech M	Innovative Insurance Development Centre	Manager	M1	90+60	V	V

Note:

* The actor is involved in both cases.

** Here, illustrating the addition of two numbers refers to the adding-up of the interview length in Phase 1 with that of Phase 2.

*** 'V' represents where the researcher has successfully obtained the data from the interviewee; 'X' means the data were not collected.

3.5.3 Sources of evidence

According to Halinen and Mainela's (2013) review of process studies in business networks, it was illustrated that numerous sources of information are collected from managers or employees, archives and documents from organisations, and workshops and meetings for interactions among actors in a value platform. Aligning with different sources of data collected in case studies, the majority of process studies combined different forms of data to acquire information from different levels of an ecosystem (Halinen and Mainela, 2013).

Multiple forms of data were combined in this study to better understand the perceptions of individuals and actors during the process of service innovation. The usage of multiple data sources enabled the researcher to obtain richer data in case studies. It not only helped deepen the understanding of value platforms but checked the validity of the qualitative data (Ritchie and Lewis, 2003). Roulston and Choi (2018) stated that criticism is often given when interviews are solely used as primary data in qualitative research when the objective of the study is to investigate how events happened in a given setting. Collecting multiple sources of data helped the researcher gain a more holistic understanding of participants' experiences. In this study, primary and secondary data were collected. Semi-structured interviews and participant-generated drawings of network pictures and critical incidents were collected at the workplace of each participant as the primary data.

Network pictures and critical incidents as visual data not only fostered participation but offered more diverse data sources, which facilitated the complexity of the value platform phenomenon. A network picture is defined as the participants' perceptions of the network in which they are involved (Ford et al., 2002). Therefore, the networks of the study were partially generated by the participants who assisted in drawing the boundaries of the value platform he or she was involved in. A critical incident refers to an incident that substantially contributes to the processual aspect of telematics service innovation phenomenon, either positively or negatively (Bitner, Booms, and Tetreault, 1990).

Furthermore, the secondary data were collected from the Internet, online news and magazines, annual reports, company documents, and archives provided by participants. The secondary data not only enriched the gathered information, but complemented the weaknesses of solely relying on data generated by interviewees. Archival data associated with telematics insurance service innovation in Taiwan between 2014 and 2021 was collected. Archival data such as regulation-related documents, online news

articles, official online reports, and webpages of actors were explored to obtain richer content from actors. Archival documents such as policy documents and online news articles provided further insights into the broader ecosystem and regulatory context in which value platforms evolution was embedded (Vandenbussche, Edelenbos, and Eshuis, 2020). Furthermore, the researcher used archival documents to complement and support retrospective interviews since archives present real-time information regarding the activities that occurred at a particular time. In other words, archives were used to verify the resource-related activities stated by interviewees. The archival data collected from diverse sources are displayed in Table 3.

Table 3. Sources of archival data

Types	Quantity	Data specifics
Regulation documents	5 docs	Written policies from the regulations database of Taiwan (2015-2021)
Online news articles	41 docs	News from mainstream media platforms (2015-2021)
Magazine articles	13 articles	Article titles with 'telematics insurance' (2014-2021)
Annual reports	8 docs	Annual company reports (2015-2018)
Official webpages	8 docs	Contents from the official website of actors
Official online reports	3 docs	Documents published by governmental institutions
Internal archives	1 doc	1 internal PowerPoint file

3.5.4 Data collection procedures

The overview of data collection phases is demonstrated in Table 4. A phased interview programme was implemented to untangle the evolution of service innovation and to explore interactions among actors in a value platform over time. Two phases of data collection were carried out in order to obtain an in-depth understanding of the evolution of value platforms phenomenon. Phase 1's data collection was conducted to collect network pictures, critical incidents, and interviewees' experiences of the telematics projects to establish the context of the interviewees' experience. Participants were first asked to talk about their roles and the background information of the value platform. In Phase 2, the researcher focused on the details of the data collected in Phase 1 and sought a more exceptional interpretation concerning tensions. The interviewees were asked to recall and reconstruct the details of their experience about the value platform

(Edvardsson et al., 2014). Additionally, the researcher had collected online news, magazine articles and written regulations with regard to the development of telematics insurance in Taiwan.

Since a single case-study approach was adopted, the data generated by multiple actors were collected for data triangulation. Additionally, multiple forms of data enriched the researcher's understanding of what happened, and who did what and when in relation to the development of telematics insurance services. These approaches enhance the validity and reliability of data collection processes (Yin, 2017). The research referred to Ramos and Ford's (2011) work, the theoretical framework, and previous literature to design the interview guide (Virlée, Hammedi, and Parida, 2015). Before collecting data, an interview guide was designed (see Appendix 1). The researcher conducted two pilot interviews, which helped the researcher improve the structure and wording of the interview guide. The interview guide of the research started with an introductory section in which the researcher explained the purposes of the study and the interview. Moreover, a participant information sheet with the research ethics statement and the consent form were provided to the interviewee to ensure their rights and confidentiality. The interview guide was divided into three main sections, namely, background questions about the participant and the telematics insurance services with which he or she was involved, drawing sections, and follow-up questions for details of the network picture and critical incidents. The researcher conducted 16 interviews in the Phase 1's data collection and 12 interviews in Phase 2's data collection.

Table 4. Two phases of data collection

Phase	Data collection phase	Total length of interviews	Data sources
1	28.11.2019 to 09.02.2020	28 hours	• 16 interviews • Drawings of network pictures and critical incidents • Field notes • Archival documents
2	01.07.2020 to 01.08.2020	20 hours	• 12 interviews • Field notes • Archival documents

3.6 Data Analysis

3.6.1 Data preparation

Timelines, service exchanges, and interactions amongst actors within the development process of telematics insurance services were collected in the first phase of data collection. The first-round data gave the researcher a general knowledge of which actors were involved, and the incidents occurring over time for the development of telematics insurance services. Subsequently, the researcher designed second-round interview questions for each individual participant after reading and reflecting on the first-round data to clarify generative mechanisms. The second-round data enabled the researcher to further explore unexpected themes emerged and created an impact in the development process.

In preparation for data analysis, interview transcripts, participant-generated drawings, fieldnotes, and archives as multiple forms of data were collected and compiled to build an aggregated database in NVivo 12, a qualitative data analysis software program (Dey, 2003; Kim, 2016). The collected audio recordings of interviews were transcribed and imported into NVivo 12. Participant-generated drawings were converted into digital images and imported into the database. Afterwards, transcribed narratives of each participant-generated drawing were imported in NVivo as picture logs for their corresponding areas in each image. This approach allows visual data to be treated in the same way as interview transcripts by focusing on both the content and language elements of an image (Bennett, Barrett, and Helmich, 2019).

Interview transcripts, images of network pictures and critical incidents, archives, and fieldnotes were read and re-read to obtain an overall and contextual understanding of the case prior to initiating coding. During the reading of all materials, the tools of memos, annotations, and see also links in NVivo were developed to track relationships, similarities and contradictions, questions, and connections (Jackson, Paulus, and Woolf, 2018).

3.6.2 Data analysis procedures

The temporal bracketing approach and the concept of context–mechanism–outcome (CMO) configurations form the analytical framework of the study. The research process was abductive, which involves a combination of induction and deduction in a non-linear and iterative process. This approach enabled the researcher to move between the theoretical elements and empirical data of the study by detecting emergent patterns in the data, reflecting on them, and moving back to the literature. Process is defined by

van de Ven (1992, p. 169) and Pettigrew (1997, p. 338) as "a sequence of individual and collective events, actions, and activities unfolding over time in context". By drawing on the above definition of process, the process of service innovation in the current research is defined as the sequence of connected events in relation to the development of telematics insurance services which emerge over time in an ecosystem. The notion of events has been an analytical tool for studying processes.

The evolution of value platforms comprised of events in relation to the development of telematics insurance services that happened sequentially. Events were viewed from a critical realist perspective as "external and visible behaviours of people, systems and things as they occur, or as they have happened" (Easton, 2009, p. 120). The integration of existing resources is acquired through service exchange among actors, which results in value co-creation. In this study, incidents that occurred in relation to the development of telematics insurance services were analysed to unfold the process of the evolution of value platforms. In other words, resource-related activities, which occurred or were experienced by actors during the development process of telematics insurance services, were the qualitative data that were empirically observed. Examples of incidents could be submitting, presenting, struggling, adjusting, and evaluating.

CIT was suggested as a data collection technique in realist evaluation to achieve an in-depth understanding of the antecedents and consequences with regard to a particular activity (Cunningham, de Brún, and McAuliffe, 2020). In other words, it supports the exploration of context–mechanism–outcome configurations in realist evaluation by enhancing the richness of activities in relation to the evolution of value platforms. Additionally, the investigation of the sequences of critical incidents helped to uncover the explanation of shifts and changes in actor interaction and service exchange activities, which generate causal links between what activities happened and how they happened. Changes in context affect changes in activities of actor interaction and service exchange, which in return lead to changes in the context of the following stage.

3.6.2.1 *Realist evaluation approach*

A realist evaluation was implemented to unravel the explanation of the nature of the evolution of value platforms. A realist evaluation serves a form of theory-driven approach to explain "what works, for whom, and in what circumstances" (Pawson and Tilley, 1997, p.144). NVivo 12 was applied as a tool for realist evaluation to facilitate a three-stage realist process evaluation of theory generation, refinement, and testing (Dalkin et al., 2021). Abductive inference and retroductive inference were employed during the process of data analysis in the realist evaluation approach to unravel the

explanation of how value platforms evolve over time. The combination of these two inferences resulted in the emergence of institutional logic as a suitable theoretical framing to explain value co-creation in the process of service innovation. On the one hand, retroductive inference unravels the causal mechanisms of the observed activities, which represent the evolution of value platforms. On the other hand, abductive inference offers an opportunity to take the tensions aspect, which was not included in the initial framing of value platforms yet emerged during data analysis, into consideration. Hence, the theoretical framing of value platform evolution was developed through the implementation of both abductive inference and retroductive inference (Meyer and Lunnay, 2013).

Both abductive and retroductive inferences were adopted to distinguish events from what caused them by investigating the development processes of telematics insurance services in which participants were involved. Nevertheless, it was noticed that tension-related data kept emerging in both actor interaction activities and resource-related activities during the process of service innovation. The emergence of tensions aspect unravelled a theoretical gap for value co-creation in the process of service innovation as the researcher moved back and forth between the data and the theory.

A retroductive approach is applied to analyse data in the realist evaluation. It unravels the generative mechanisms that lie behind the identified events in relation to the development of telematics insurance services (Wong et al., 2016). Retroduction enables the identification of causal powers underlying identified events or changes in those events. Retroduction involves the implementation of both inductive and deductive reasoning in multiple data sources to test and refine activities that occurred among actors to develop telematics insurance services (Gilmore et al., 2019).

The researcher used abductive inference by interpreting and re-interpreting data, which permits the researcher to identify inconspicuous connections in relation to the identified events. Tensions emerged in the abductive step of data process that may emerge as new concepts for findings. Afterwards, the researcher worked on identifying the conditions that underlie a certain concept in order for the concept to occur. Consequently, the combination of the two inference approaches enabled the development of new conceptual framework.

3.6.2.2 *Phase 1: Coding and identifying the sequence of events*

An inductive approach was adopted to identify patterns of resource-related activities. According to Given (2008), coding in qualitative studies refers to the inductive process

of ideas and concepts generation from raw data, which is interviews, visual, and archival data in this research. The coding process involves ideas, concepts, and themes identification and arrangement by researchers from the collected data. In this study, the researcher began with open coding to identify resource-related activities and their sequences by immersing herself in multiple sources of the collected data. Open coding provided a description for each activity, which resulted a large number of codes. The usage of memos, annotations, and 'see also' links in NVivo facilitated the process of categorising codes to generate themes after open coding. Afterwards, axial coding was adopted to group incidents occurring in both embedded cases into an event as a higher-level category of incident. Each event refers to a pattern of resource-related activities observed or experienced by multiple actors in the ecosystem, which serves as a theoretical construct for the evolution of value platforms. These steps enable the researcher to interpret and develop resource-related activities into a higher level of events by staying close to data sources (Willig and Rogers, 2017).

All forms of data were coded in NVivo to develop the categorisation scheme (Ramos, 2008). The first step of qualitative data analysis was to identify resource-related activities occurring among actors that are relevant to the development of telematics insurance services based on participants' observations and experiences. In addition, the participant-generated drawings of critical incidents and network pictures facilitated the conceptualisation of the content and sequence of events. The sequence of events was identified to obtain an in-depth understanding of how things evolve over time, forming the process aspect of value platforms. Additionally, the researcher drew on the content and narratives in the critical-incident drawing section to cross-check resource-related activities that happened in the embedded cases.

Process coding was adopted to code events that happened over a period of time. Namely, events form the process of how telematics insurance services were developed over time. The description of each event code was formed as an ordinal number followed by a description of a certain continuity in the incidents within each period of time. The evolution of value platforms as a research objective indicates that process is not sequentially pre-defined. Hence, the temporal bracketing approach introduced by (Langley, 1999) was applied to structure the description of each event. It facilitated the examination of how incidents in one period caused changes in the context, which will influence incidents occurring in following periods. The description of each event code implied a certain continuity in the identified incidents within each period of time along with certain discontinuities at the border of each period. In other words, this approach was considered as suitable for explaining the evolution of value platforms.

3.6.2.3 *Phase 2: Retroduction of generative mechanisms to synthesise context–mechanism–outcome configurations*

Retroduction in critical realist ontology enables the identification of the basic prerequisites in the actual- and empirical-level of reality (Ritz, 2020). In other words, retroduction was implemented to explain the evolution of value platforms through a context–mechanism–outcome configuration (CMOC) approach. CMOCs are synthesised during retroductive data analysis regarding the contextual conditions that triggered actors to change their behaviour and further led to empirical consequences. Retroductive reasoning is suggested to help researchers describe and explain the process of service innovation through a reconstruction of events that occurred in relation to service innovation in ecosystems.

The researcher implemented retroductive reasoning in events codes to extract contexts, mechanisms, and outcomes. This allowed the illustration of potential generative mechanisms, which formed the explanation of each stage of value platform evolution through an iterative process of adopting inductive and deductive logic. Both inductive reasoning and deductive reasoning were applied in retroduction to help the researcher interrogate the causal factors which may have resulted in certain outcomes.

Retroduction was explained in The RAMESES II Project (2017, p. 1) as "the identification of hidden causal forces that lie behind identified patterns or changes in those patterns". The generative mechanism of retroduction were used to help the research formulate CMOCs regarding the evolution of value platforms. Key events were adopted as checkpoints on the development of telematics insurance services. The CMOC approach was used as an analytical tool to conduct retroductive data analysis for realist evaluation in the study. CMOCs depict outcomes (O) which were generated through certain generative mechanisms (M) activated by particular contextual factors (C) (Gilmore et al., 2019). The researcher investigated generative causation in the evolution of value platforms by identifying patterns of events in different layers of reality. The researcher created a loose conceptual framework to depict the evolution of value platforms based on tentative contexts, mechanisms, and outcomes.

Multiple data sources from interviews, participant-generated drawings, archives, and fieldnotes were used to cross-check the accuracy of events and investigate the generative mechanisms (Makkonen, Aarikka-Stenroos, and Olkkonen, 2012). Semi-structured interviews served as the main source for theory testing and refinement due to the richness of interviews for extracting CMOCs. Afterwards, the researcher moved

on to images, archives, and fieldnotes to assist with the development of explanations. This step allowed the researcher to refine, challenge, and develop CMOCs from data extracted from interview transcripts. Once events codes were identified, an iterative data analysis approach was adopted to build explanations for how value platforms evolve by moving back and forth between data collection and analysis (Flick, 2018).

Each context code of CMOCs was formed based on the first letter of context followed by a description of a pattern of activities in relation to changes that occurred in the ecosystem. Moreover, each mechanism code of CMOCs was formed based on the first letter of mechanism followed by a description of a pattern of activities of actor interaction and resource-related activities in the development process of telematics insurance services. Additionally, each outcome code of CMOCs was formed based on the first letter of outcome followed by a description of a pattern of intended and unintended consequences that occurred in the ecosystem. Eventually, the researcher synthesised context, mechanisms, and outcomes in the two value platforms to unfold the evolution of value platforms into five stages of CMOCs in the service ecosystem over time.

3.6.2.4 *Phase 3: Abductive step of data processing*

An abductive approach was adopted in the process of data analysis to enable the iteration between the empirical aspect and theoretical framings. This approach facilitated the sense-making process to figure out the most suitable explanation of value platform evolution through the collected data. Abduction uses theorical framings as mediators to extract explanations of how value platforms evolve (Modell, 2009), and it facilitates the co-evolution between both theoretical framework and data analysis (Sebastiani and Anzivino, 2021). That is to say, the researcher constantly went back and forth between the theory and the data to shape and re-shape the theoretical framework according to the empirical findings extracted from the data. Although the five stages of CMO configuration focus on demonstrating the phenomenon of value platform evolution, there was lack of theoretical framing to explain such a phenomenon (Mukumbang et al., 2020). Therefore, abductive reasoning was implemented to identify the theoretical explanation for value platform evolution. Eventually, it was recognised that the theoretical lens of institutional logics offers a suitable theoretical explanation for value platform evolution as the researcher interpreted and re-contextualised the five stages of CMO configuration. That is to say, abduction as an analytical process enabled the re-description of value platform evolutions through a theoretical framing (Mukumbang et al., 2020).

To develop how value platforms evolve, the researcher proposed the most plausible explanation in each stage through abductive reasoning. The most plausible explanation in each stage was derived from the researcher's interpretation and re-contextualisation of observed activities by drawing on an incomplete set of activities in each stage of value platform evolution. Stages of value platform evolution identified through retroductive inferencing served as the first-order concepts. These stages unfolded the conceptual and linguistic themes used by actors to demonstrate their perceptions and experiences in the development process of telematics insurance services (Cassell, Cunliffe, and Grandy, 2017). Afterwards, the empirical data, stages of value platform evolution, and the theoretical lens of institutional logic were further used to develop a second-order model of tensions resulting from co-existing institutional logics in the service innovation process. Such process presented an abductive inferencing through interpretive research. The researcher adopted a theoretical lens to transform the first-order concepts into a theoretical understanding of value platform evolution in service innovation process, which tied closely to the empirical data (Cassell, Cunliffe, and Grandy, 2017). Both abduction and retroduction serve as two complementary inference approaches in critical realism to investigate the theoretical explanation for value platform evolution (Ritz, 2020).

3.7 Quality of the Study

To improve the study's validity and reliability, several approaches were adopted. Validity indicates the accuracy of the findings, while reliability refers to the consistency of the approaches adopted by the research (Creswell and Creswell, 2018). Validity through a realist lens in service ecosystems centres on multiple actors' perspectives around a particular activity. Qualitative validity was increased by triangulating various perspectives from different actors towards the telematics service innovation process since this built a coherent justification for stages of value platforms evolution in service ecosystems.

Since service ecosystems involve the participation of diverse actors, gathering different actors' perspectives better reflects the composition of ecosystems in the real world. To disentangle the reality of value platforms evolution within service ecosystems, different actors' perspectives were gathered and triangulated based on the realism paradigm (Healy and Perry, 2000). Data was mainly triangulated through comparisons of information provided by interviewees from different actors to understand the reality of how value platforms evolved within service ecosystems from a realist standpoint. When data generated by interviewees from different actors confirmed and enriched other

information, such evidence enabled the researcher to unravel the evolution of value platforms embedded in service ecosystems over time. Hence, the researcher used statements from interviewees of different actors to triangulate the data and information collected from the semi-structured interviews, network pictures, and critical incidents. Furthermore, participants were interviewed at two different points of time, which enabled the researcher to analyse changes over time and compare the evidence.

Apart from validity, reliability is also an important aspect for the researcher to take into consideration during data analysis. The gathered archival data was used for not only triangulation purposes but to enrich the data collected from interviewees. To explore the evolution of value platforms embedded in service ecosystems, the researcher triangulated the archival documents regarding the chronology of certain resource-related activities with the timelines and verbal data generated by participants in the critical incidents section. The archives supported and strengthened the information collected from the interviewees by reducing retroductive bias and improving reliability in process research (Villani and Lechner, 2021). Furthermore, the researcher increased methodological trustworthiness by illustrating the detailed procedure of collecting multiple data sources, presenting a granular view of the case study through summarising the evolution of each value platform into a process map, and demonstrating relevant quotations in each subsection of the findings chapter. These approaches enable the study to be audited which increase the reliability of the study.

3.8 Methodological Limitations

Due to limited access and time constraints, this research conducted a retrospective study to explore the service innovation process. Nevertheless, the researcher collected and analysed not only retrospective semi-structured interviews but participant-generated drawings and archival documents such as written regulations and online news articles to establish a longitudinal understanding of actors' relating dynamics within service ecosystems in retrospect. The researcher combined semi-structured interviews with visual and archival data to mitigate retrospective bias. Archival data provided contextual conditions and background during the service innovation process over time. Furthermore, it provided a fruitful description of what took place to establish the chronology of the events (Halinen, Tornroos, and Elo, 2013)

The visual data alone was insufficient to understand the reasons behind actors' interactions and behaviour. Thus, this study used the semi-structured interview method as the main method and incorporated the implementation of CIT and network pictures

to complement the weaknesses of using these research methods individually. This enriched the researcher's understanding of the contextual and situational factors in the service innovation process.

Thus, multiple forms of data such as archives, interviews, and participant-generated drawings were collected to increase the accuracy of the data. Although the implementation of CIT pays attention to actual incidents that occurred in the service innovation process, it has been criticised for studying past events based on the recollection from the individual informant instead of observing them directly (Bott and Tourish, 2016). The individual participant may encounter the issue of recall bias, which might result in misrepresentations of the participants' experiences and observations (Medberg and Grönroos, 2020). Such critiques challenge the reliability and validity of the study. Hence, this study addressed the limitations of CIT by collecting critical incidents from participants in various actors. Moreover, network pictures drawn by participants could be biased to a certain extent, since the participants' positions in the service ecosystem might influence their perceptions and experiences while being involved in the telematics ecosystem (Jaspersen and Stein, 2019). Therefore, such potential bias was eliminated by selecting informants ranging from junior staff to senior executives to broaden the understanding of the scope of the telematics ecosystem.

In addition, it was acknowledged that the researcher had limited access to participants in technology firms. One issue of a retrospective study is that some employees of technology firms involved in the development process of telematics insurance were no longer with the firm. Hence, the key informants in technology firms such as the project managers of telematics technology and the key personnel from the IT departments of insurance companies in charge of coordination with technology firms were interviewed to address this issue. Additionally, a phased programme interview approach was applied to validate the findings since each informant was interviewed twice at a different point in time. The researcher took this opportunity to reflect on the data collected in Phase 1 and designed interview questions for Phase 2 interviews specifically for each interviewee.

3.9 Challenges and Lessons Learned

There are two main challenges around research design and data collection in the current study, namely limitation of case selection and high turnover rate in the technology industry. Firstly, the limitation of case selection resulted from the outbreak of the Covid pandemic. When the researcher started her PhD study in 2018, she initially planned to

gather telematics service cases from three countries, namely Taiwan, the United Kingdom, and Japan. However, the researcher was not able to successfully obtain access from any Japanese telematics projects after cold emailing and approaching the branches of the Japanese insurers in Taiwan. At the end of 2019, the researcher successfully obtained access and conducted first-round interviews with two telematics insurance projects in Taiwan.

Meanwhile, the researcher had put effort into building networks and connecting with key insurance practitioners in the UK in the autumn of 2019 by participating in insurance-related conferences and attending the European Risk Management Forum. The European Risk Management Forum enabled the researcher to meet and approach potential practitioners in the UK insurance industry. As a result, the researcher initially planned to collect data in the UK by participating in an insurance-related conference held in the UK, which focused on the aspect of innovation in the risk management and insurance sector, since she was offered an opportunity to participate in the conference and conduct interviews with practitioners. Nevertheless, the data collection plan in the UK was disrupted due to Covid-19. In early 2020, the UK government implemented lockdown across the country and announced that it would only be lifted after mid-May at the earliest. This led to the cancellation of the insurance-related conference by the organiser, and the situation in Europe has remained uncertain since. Since the research involves drawing sections, which are challenging to conduct remotely, the data has to be collected face to face as the researcher has to interact and come up with probing questions according to the participant's drawings and verbal answers. Hence, the researcher has come up with a modification of a data collection plan to face this unprecedented and unpredictable situation to reduce the uncertainty of the project and to finish the PhD on time. The researcher returned to Taiwan and conducted second-round interviews with existing interviewees and approached more potential interviewees in the summer of 2020. The data collection of two embedded cases in Taiwan can offer a more in-depth exploration and holistic understanding and minimises the risk of data collection disruption as the researcher can still visit the company sites to conduct interviews.

Secondly, the researcher only managed to conduct interviews with a manager from Tech M to obtain the technology firms' perspective. The researcher could not reach a sufficient number of participants from the technology firms since the technology industry has been well-known for its high turnover rate among various industries over the years. When the researcher asked interviewees from Insurer T to refer her to potential participants from Tech W and Tech C that were involved in the development

of telematics insurance, she was informed that the coordinators from Tech W and Tech C at that time had left the company and even the insurance companies had lost contact with them. To further enrich the perception of technology firms, the researcher collected archives such as new articles which contains interviews with the CEO of Tech C and information of telematics insurance associated with Tech C and Tech W. Moreover, annual reports published by Tech M between 2015 and 2018 were collected. These different data sources enabled the researcher to compare and obtain richer data for technology firms' perspective in ecosystems.

3.10 Conclusion

To sum up, the methodology chapter summarises the philosophical assumptions, the research design, research methods, and the procedures of data collection and data analysis of the research. A critical realist philosophical standpoint was taken to investigate the phenomenon of value platform evolution, which seeks to uncover the mechanisms that underlie resource-related activities in ecosystems to develop service innovation over time. A processual and embedded single case-study approach was implemented in the contextual setting of telematics insurance development in Taiwan. Both verbal and visual approaches, namely semi-structured interviews, CIT, and the network pictures approach, were applied to collect data from the selected participants in multiple actors that constituted the telematics ecosystem. Afterwards, a realist evaluation approach was adopted as the data analysis approach to depict the evolution of value platforms and to identify the theoretical explanation for value platform evolution. Furthermore, the quality of the study, methodological limitations, and how the limitations were addressed in this study were discussed. Ultimately, the chapter concluded with challenges encountered during research design and data collection and the lessons the researcher learned during such process.

CHAPTER 4 FINDINGS

4.1 Introduction

The overarching case study comprises the evolution of value platforms within a service ecosystem. Within the case, there are two embedded cases. However, the dynamic resource-related activities conducted by actors, which result in service innovation, transcend each embedded case. Such activities are manifested at not only the embedded case level but also the overarching case level. Figure 4 visualises the involvement of actors which constitutes the service ecosystem with the two embedded value platforms. The actors within the two circles refer to the specific value platform in which they were involved during the development process of telematics insurance. Actors outside of the circles were involved in the telematics ecosystem as a whole. Moreover, the background information of the case is illustrated in Section 4.2.

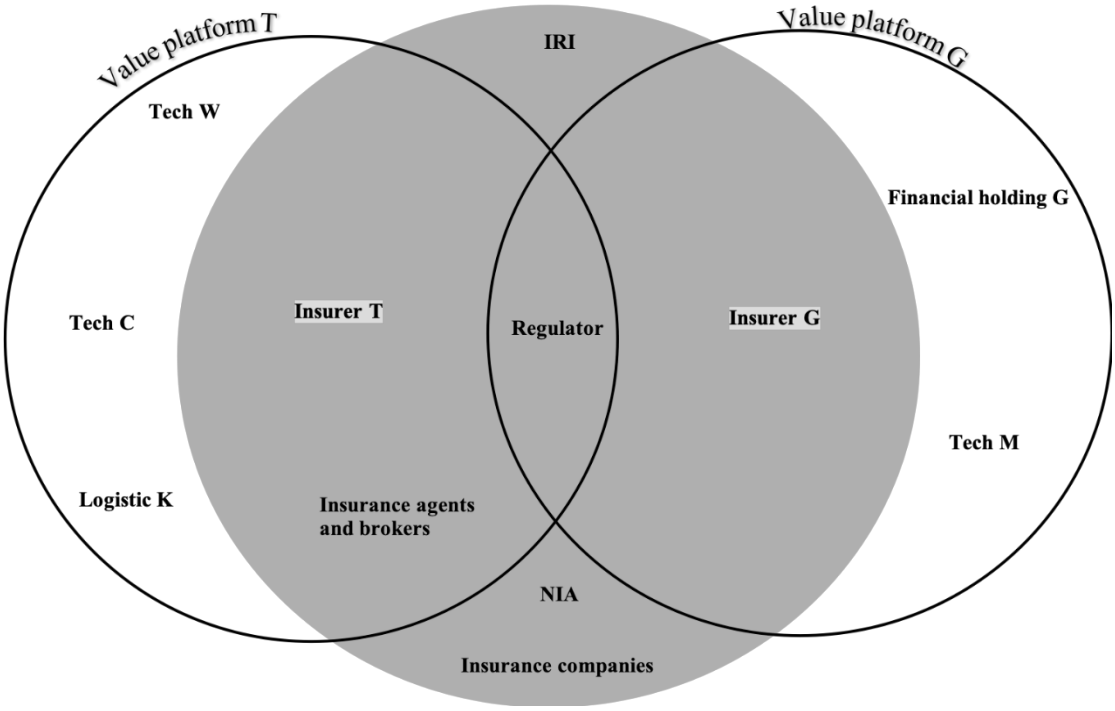


Figure 4. Actors in the overarching telematics ecosystem

Section 4.3 presents the first findings chapter regarding findings that address the temporal nature of value platform evolution within the service ecosystem. The presentation format of the findings begins by depicting evidence from a broader perspective by summarising events encountered or conducted by actors from an ecosystem aspect. Afterwards, the events occurring in the ecosystem were broken down into further details by demonstrating different resource-related activities executed or

experienced by specific actors respectively. Key evidence was illustrated as quotes to provide a granular view of the findings. Moreover, a table that summarises examples of the data was displayed at the end of each sub-section. Temporal bracketing is utilised to show how the value platforms evolve over five stages within the service ecosystem. The five stages form the building blocks of the evolution of the value platforms. In other words, the sets of activities within each stage build upon each other (see Section 3.6.2.2 for definitions of activities and events). In Stage 1, actors undertook activities to investigate the value of service innovation. Stage 2 is characterised by activities to seek complementary resources. In Stage 3, the findings unravel sets of activities oriented towards the combination of complementary resources. Stage 4 is characterised by activities which communicate the value of the service offering to customers. Lastly, in Stage 5, actors carried out activities to evaluate the delivered value of service offerings. Each stage is unravelled through context-mechanism-outcome (CMO) configurations. The CMO configurations untangle the dynamic interactions and service exchange among actors resulting in the evolution of value platforms in the service ecosystem.

Table 5 provides a definition of contexts, mechanisms, outcomes, and CMO configurations as used and applied to the case. The CMO configuration of each stage delineates how changes in the ecosystem and changes in actors' activities affect activities of interaction and service exchange among actors which lead to certain outcomes along the value platform evolution journey. Detailed evidence of CMO configurations is provided in the appendices regarding the activities related to contexts, mechanisms, and outcomes from the empirical data. Codes presented in the CMO configuration summary in each stage were used to guide the reader to find the corresponding section in the appendices. For instance, the code of S1C represents the context in Stage 1 of value platform evolution; S1M refers to the mechanism in Stage 1 of value platform evolution; S1O depicts the outcome in Stage 1 of value platform evolution.

Section 4.4, as the second findings chapter, describes and evidences three types of process-related tensions resulting from co-existing institutional logics unravelled from the analysis of the evolution of the value platforms. These are tensions between societal logic and regulatory logic, between innovation logic and market logic, and between service provision logic and boundary-setting logic. Moreover, there are three navigating mechanisms based on the analysis of the practices adopted by actors to navigate the process-related tensions in the telematics ecosystem. These are 1) applying effectual decision-making techniques, 2) boundary-drawing, and 3) demonstrating adaptation.

Applying effectual decision-making techniques refers to the implementation of decision-making techniques which allow actors to come up with solutions based on their existing resources, maintain affordable losses in investment, and form collaboration partnerships. The boundary-drawing mechanism represents the creation of boundaries around resources and values which actors can utilise or take into consideration while developing service innovation in service ecosystems. The mechanism of demonstrating adaptation refers to actors showing their actions of complying with regulatory requirements and adapting to contextual changes.

Table 5. The definition of context, mechanism, outcomes and CMO configurations as applied to the case

Context (C)	Context concerns the background in which events occur in the ecosystem that are influential for the development of telematics insurance services. It serves as a facilitator or impediment for triggering mechanisms.
Mechanism (M)	Mechanism is concerned with resource-related activities, in relation to the development of telematics insurance services, which are influenced by contextual changes.
Outcome (O)	Outcomes refer to intended and unintended consequences which affect the development of telematics insurance services.
Context-mechanism-outcome configuration (CMOC)	The way dominant contexts, mechanisms and outcomes relate to each other and are configured within each stage.

4.2 Case Background

The overarching case of the study refers to the service ecosystem of telematics insurance services in Taiwan. It is termed as 'telematics ecosystem' in the following chapters. An embedded case is a value platform which represents an emerging structure around the development of telematics insurance service. Two embedded cases aimed to develop telematics insurance services are investigated, namely, Value platform T (VP_T) and Value platform G (VP_G).

Table 6 demonstrates an overview of the two selected embedded cases in Taiwan. VP_T refers to the emerging structure around the development of Insurer T's telematics insurance service, while VP_G represents the emerging structure around the development of Insurer G's telematics insurance service. The core actors in the telematics ecosystem and their background information and responsibilities with regard to the development of telematics insurance services are summarised and shown in Table 7.

The value of service innovation refers to benefits of the development of telematics insurance for certain actors. The perceived value varies between actors. The regulator perceived the value of service innovation as addressing government policies to support the development of insurance technology. Insurance companies viewed the value of service innovation as providing better insurance services for their customers. Technology companies considered the value of service innovation as expanding the application of telematics technology into the insurance sector. Table 8 displays a glossary of terms used in the case and analysis. Table 9 demonstrates the CMO configurations of the development of telematics insurance services along with codes of activities between Appendix 2 and Appendix 6. Additionally, examples of the participant-generated drawings of network pictures and critical incidents are displayed in Appendix 7 and Appendix 8.

Further detailed accounts of the findings regarding the resource-related activities that occurred in Value platform T and Value platform G are illustrated in Figure 5 and Figure 6, respectively. The researcher drew on the process flowchart framework from Langley and Truax (1994) to visualise the evolution of the two value platforms. Within the two figures, the timescale at the bottom of the figure exhibits the temporal sequence of resource-related activities by unfolding the sequence of activities. Each box refers to a resource-related activity that happened during the telematics service innovation process. Each activity was classified into one of six different aspects within the telematics ecosystem represented by the horizontal bands in the figures. For instance, boxes located in the horizontal band of market are activities directly linked with the market aspect, such as market competition, market analysis, and market launch. Boxes which cross more than one band represent activities that were associated with several aspects simultaneously and did not fall into a single aspect. Moreover, horizontal lines show the continuation of the influence of particular activities. The vertical arrows demonstrate the influence of particular activities on a certain activity they are pointing towards.

Table 6. An overview of the two selected embedded cases in Taiwan

	Network actors	Background
Value platform T (VP_T)	• Insurance companies • A technology start-up • Technology firms • A logistics firm • Insurance regulator • Insurance intermediaries • Insurance agents and brokers	The first insurance company launched telematics insurance services in Taiwan.
Value platform G (VP_G)	• Insurance companies • Insurance regulator • Insurance intermediaries • Technology firms • Insurance competitors	The insurance company was a top insurer that has a large market share of motor insurance in Taiwan.

Table 7. Background information of the core actors within the telematics ecosystem with regard to the development of telematics insurance services (source: summarised from the collected data)

Core actor	Acronym used in the study	Background information
Financial Supervisory Commission	FSC	A government regulatory agency subordinate whose role is to strengthen safeguards for consumers, maintain financial stability, and promote the development of financial markets in Taiwan. It is responsible for developing, supervising, regulating, and examining financial markets and financial service enterprises in Taiwan.
The Insurance Bureau	Regulator	A subordinate of the Financial Supervisory Commission (FSC) which plans and implements the supervision and regulation of the insurance market and insurance enterprises. As a regulatory agency, its duties include consumer protection, supervision, and management of new types of non-life insurance and the existing non-life insurance.
Insurance Research Institute	IRI	It provides a communicating platform for the insurance regulator, the insurance industry, and consumers. Its missions involve assisting the regulator in conducting research and formulating regulatory policies, protecting the interest of consumers, advocating correct insurance concepts, and promoting insurance knowledge.
Non-life Insurance Association	NIA	It was formed by non-life insurance companies and re-insurance companies to foster a good operational foundation for insurance companies and set up regulations for developing new insurance products. It serves as a bridge to liaise and mediate between the government and insurance companies and between insurance companies. The Motor Insurance Committee of NIA is set up in respond to the business development needs of motor insurance.
Insurance company T	Insurer T	It is the first private insurance company in Taiwan. Its core values are peace of mind, passion, and innovation. It launched the first telematics insurance policy in the Taiwanese insurance market.
Logistics firm K	Logistic K	A logistics firm that insures its car fleets with Insurer T. It provided Insurer T with the driving data of its car fleets.
Technology firm W	Tech W	A software development company that offers services in programming, website design, developing applications.
Technology firm C	Tech C	It is the Internet of Things (IoT) subsidiary of a technology group in Taiwan that aims to provide data services and technological solutions for industries such as car manufacturing and insurance.
Insurance company G	Insurer G	It is the non-life insurance subsidiary of a top financial holding (Financial Holdings G) in Taiwan.
Technology firm M	Tech M	It was formed by the government and became a private company that aims to provide a wide range of value-added network services and explore network resources in insurance services and customs clearance. It offers services like data exchange, consultation, value-added services, internet-related services.
Insurance agent A	IA	Serves as a type of distribution channel for insurance companies.

Table 8. Glossary of terms used in the case

Term	Definition
Actuarial rate	Insurance companies estimate the expected value of the future losses which is predicted according to historical data and consideration of risk involved (Investopedia, 2021).
Insurance agents	An insurance agent in this study refers to an organisation which solicits, negotiates, or instigates insurance contracts on behalf of an insurance company and can be independent or an employee of the insurance company. It serves as the legal representatives of insurance companies, rather than policyholders, with the right to perform certain acts on behalf of the insurance companies they represent, such as to bind coverage (International Risk Management Institute, 2022).
Insurance brokers	An insurance intermediary which represents the insured rather than the insurance company. It does not have the right to act on behalf of insurance companies. While some brokers have agency contracts with some insurance companies, they usually remain obligated to represent the interests of insureds rather than insurance companies (International Risk Management Institute, 2022).
Insurance policies	An insurance policy is a contract which the insured signs with an insurance company for financial protection or reimbursement against losses.
Insurance rider	The provision of an insurance policy which adds benefits to or amends the terms of a basic insurance policy (Investopedia, 2022).
Primary cover	The policy which responds first to the loss of an insured, either on a first dollar basis or after allowing for a deductible. When the primary coverage limits are paid, any remaining loss is covered by whatever excess layer of insurance may be in place (International Risk Management Institute, 2022).
Telematics	Telematics refers to 'the integrated use of communications and information technology to transmit, store and receive information from telecommunications devices to remote objects over a network.' (TechTarget, 2017).
Telematics applications	A mobile application which utilises sensors in mobile phones to collect driving behaviour.
Telematics devices	An on-board diagnostic (OBD) device, which can be installed in the OBD port of vehicles to collect driving behaviour through sensors inside the vehicle.
Telematics insurance	A new type of motor insurance which calculates insurance premiums based on the behaviour of the customer such as hard braking, time of travel, acceleration.
Traditional motor insurance	Traditional motor insurance refers to motor insurance which established actuarial rates for calculating motor insurance premiums based on factors, such as driver's age, gender, claim records, vehicle make and model. In Taiwan, the factors of gender and driver's age were developed through long-term data collection and statistics by IRI.
Underwriting policy	A set of rules and requirements provided by an insurance company for its agents and underwriters. The underwriter uses these policies to make decisions regarding the acceptance, modification, or rejection of a prospective insured (International Risk Management Institute, 2022).

Table 9. The context-mechanism-outcome configurations of the development of telematics insurance services

Stage		Description of key events	Types of activities	Codes of activities in Appendices
Stage 1	Context (S1C)	The emergence of advanced technologies in the sector	Change of government policies to support the development of financial technology	1abc
			Implementation of advanced technologies	1de
		The entry of the first mover	Insurer T became the first to enter the telematics insurance market	2ab
			Issues in the traditional motor insurance	2c
	Mechanism (S1M)	Investigating the value of developing telematics insurance	Conduct studies to understand telematics insurance	3abc
			Examine the application of telematics technology in the sector	3def
		Tensions experienced by actors	Financial impacts	3gh
			Threat to corporate image	3ij
			Ensure market stability	3jk
	Outcome (S1O)	Assessment of value	Identify value of providing telematics insurance	4abcde
			Expectations for service innovation	4f
			Set strategies for developing service innovation	4g
		Realisation of lack of resources after investigation	Lack of data to establish the pricing model of telematics insurance	5a
			Lack of technology capabilities to develop telematics technology	5b
			Lack of qualification to conduct insurance activities	5c
Stage 2	Context (S2C)	Telematics technology as a new concept in the sector		6ab
		Internal deficiencies	The impetus to have driving data in the sector	7ab
			Requirements of technological capabilities to collect driving data	7bc

Stage		Description of key events	Types of activities	Codes of activities in Appendices
	Mechanism (S2M)	Clarifying the adequacy of telematics technology	Lack of regulatory guidance	8ab
			Communicate with Regulator	8c
			Conduct internal auditing	8d
		Acquiring complementary resources	Approach and share information and ideas with potential business collaborators	9adf, 10bc
			Concerns of information and idea sharing	9be
			Concerns of trustworthiness of telematics techniques	10a
			Separate know-how	9c
	Outcome (S2O)	Establish collaborative relationships		11
		Permission of the development of telematics insurance		12
Stage 3	Context (S3C)	Development of service innovation requires a combination of complementary resources		13
		Regulatory requirements		14ab
	Mechanism (S3M)	Combining complementary resources for the required resources	Combine insurance data with telematics technology	15abc
			Knowledge gaps between insurance companies and technology firms	15d
		Reviewing the eligibility of telematics insurance	Examine and communicate for the appropriateness of telematics insurance	16a
			Insufficient understanding of the rationale behind telematics insurance	16bc
			Apply approaches to align with regulatory requirements	16de
	Outcome (S3O)	Achievement of service innovation		17
		Received regulatory approvals		18

Stage		Description of key events	Types of activities	Codes of activities in Appendices
Stage 4	Context (S4C)	New services were required to be introduced to the market		19ab
	Mechanism (S4M)	Communicating the value of telematics services	Popularisation telematics applications and devices	20aefg
			Hurdles to adopt telematics services	20bcd
		Encouraging insurance technology	Propose to share collected driving data among insurance companies	21ab
			Tensions result from market competition	21c
			Protect first mover advantage through patents	21d
	Outcome (S4O)	Service provision	Customers experienced fairer premium calculation	22a
			Increase interactions between actors and customers	22b
			Utilisation of telematics technologies	22c
Stage 5	Context (S5C)	Market response		23ab
		Entry of new entrants with various techniques		24ab
	Mechanism (S5M)	Evaluating the effect of service innovation	Recognise inappropriate telematics techniques insurance	25a
			Monitor the performance of telematics insurance	25bc
			Improve telematics technology	25def
		Political intervention	Interpellation from legislators	26
	Outcome (S5O)	Regulator intervention	Regulator announcement and establishment of new rules	27ab
		Adjusted the strategies of service innovation	Suspend sale and reduce resource dependence	27cd
			Adjust the strategies of promoting telematics technology	27e

Figure 5. The process map of Value platform T

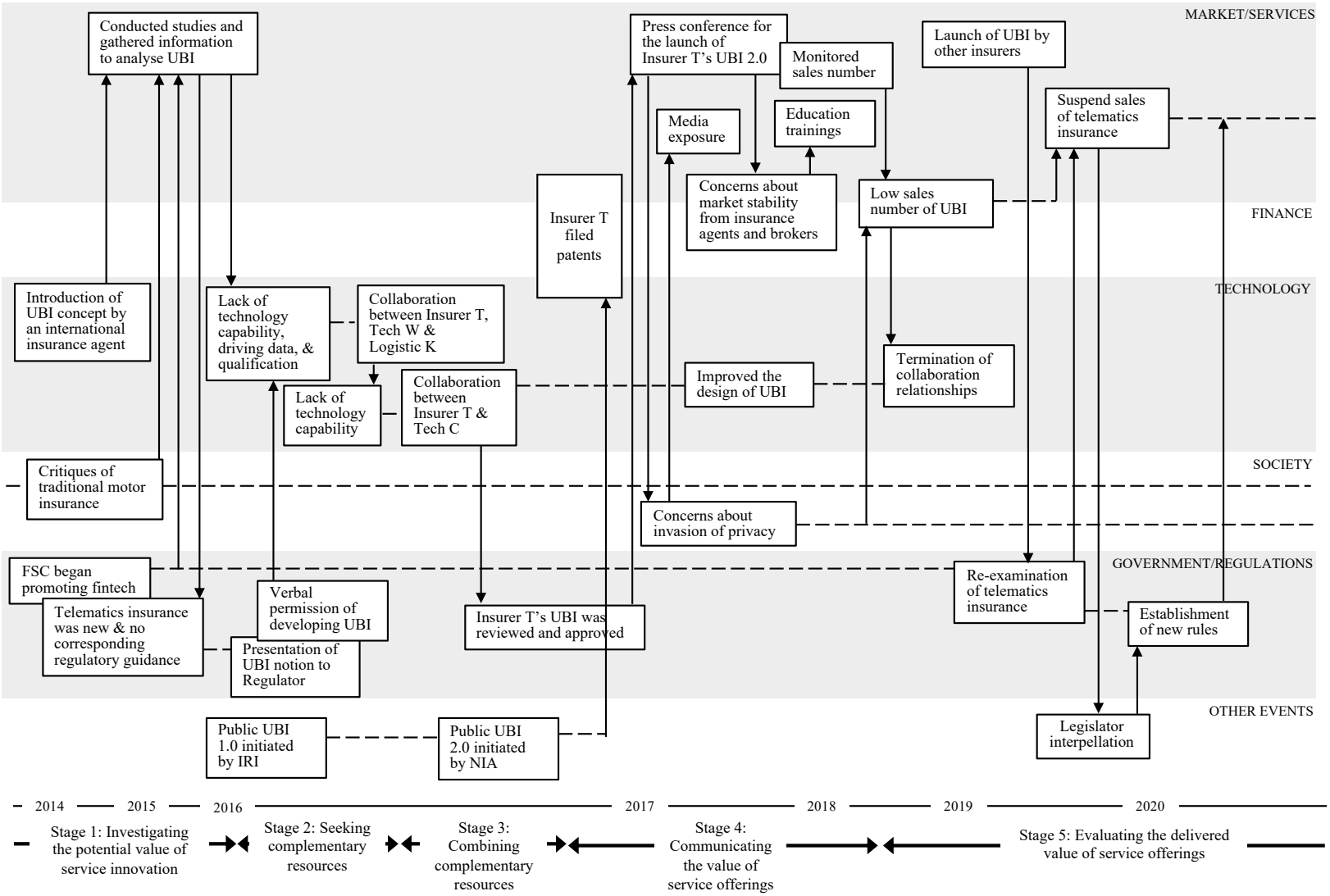
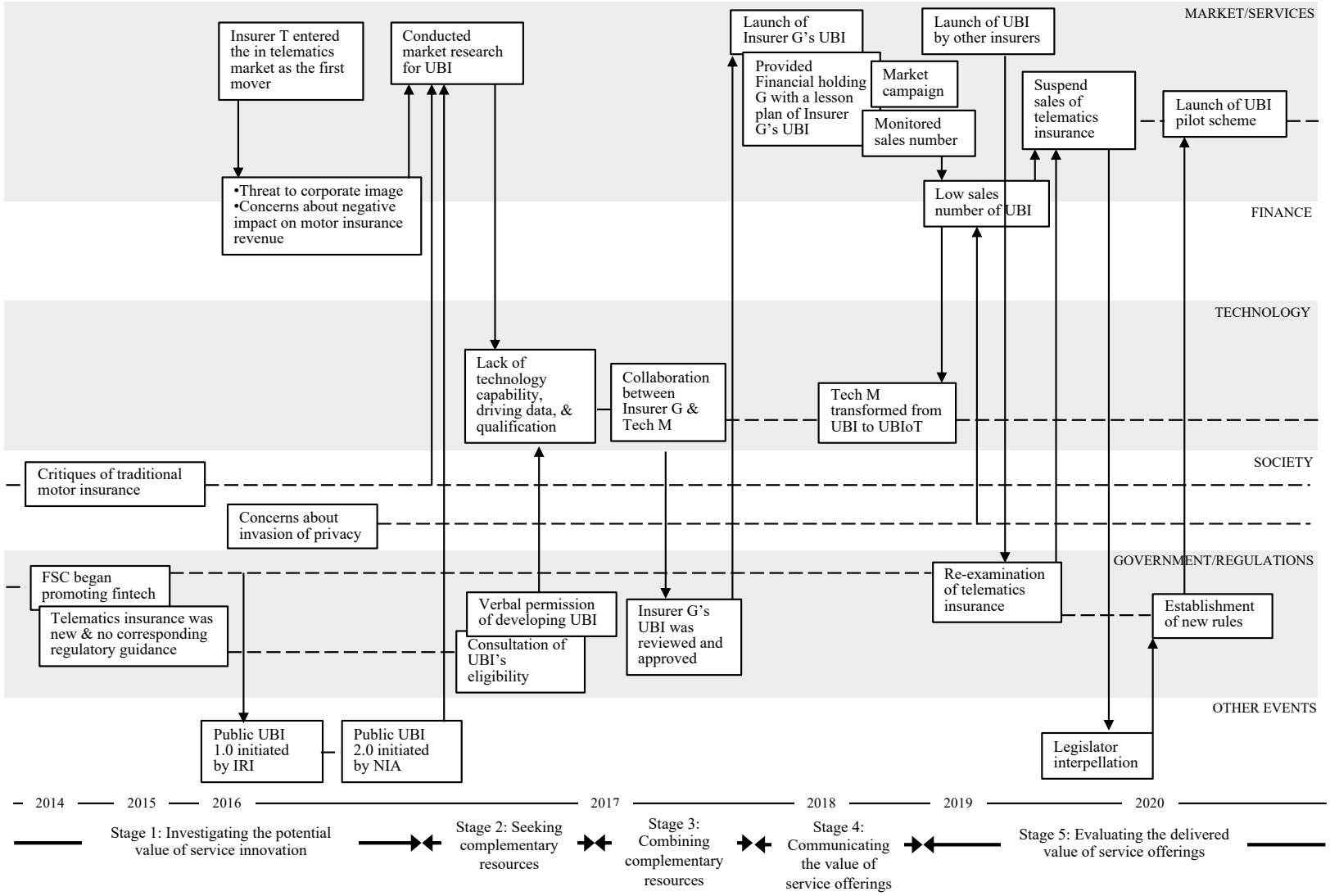


Figure 6. The process map of Value platform G



4.3 Synthesis of Value Platform Evolution from a Temporal Perspective

4.3.1 Stage 1: Investigating the value of service innovation to address emerging technologies and catalytic changes

CMO configuration 1 summary: During this stage, advanced technologies emerged and catalytic changes occurred in the insurance sector (S1C). These situations acted as a trigger for actors to start investigating the value of developing telematics insurance (S1M). Subsequently, actors assessed the value of telematics insurance and realised they lacked resources to achieve the development of telematics technology (S1O).

Context (S1C):

The findings reveal the emergence of advanced technologies in the sector. The application of advanced technologies and support from government agencies were stressed. The implementation of advanced technologies such as Internet of Things (IoT) began spreading to a wide range of sectors such as the insurance sector as it provided an innovative approach for organisations to obtain a type of data that was not accessible in the past. According to an online news article published in 2017,

> *"IoT is the interconnection via the internet of devices embedded with communications software and hardware, processors, sensors and network connectivity, enabling them to send and receive data without human-to-human or human-to-device interaction. For financial institutions that means new opportunities for the collection and protection of data. Fintech IoT applications that could add to consumer convenience include ATM transactions based on smartphones or smartwatches rather than debit cards, or car insurance rates geared to policyholders' driving behaviour." (Online news article: 3. Nov. 2017)*

Additionally, government agencies such as FSC and the insurance regulator began encouraging the implementation of advanced technologies in the financial industries by proposing plans to promote the development of new types of insurance. This phenomenon allowed actors to begin realising the opportunities to apply advanced technologies in motor insurance. FSC established a project which loosened certain policies to create a friendly environment for the financial industries to develop financial technology. As stated in the report published by U.S. Commercial Service,

> *"Starting in 2014, FSC began to play a more active role in creating an atmosphere that would foster the growth of financial technology by launching the 'Digital Financial Environment 3.0' project. ... Insurance companies were allowed to provide low-risk electronic services online such as acquiring insurance…" (OR1)*

The insurance regulator's attitude towards innovation changed since a public version of telematics insurance was initiated by the regulator through NIA, as confirmed by the Section Chief of Insurer G,

> *"At that time, NIA had organised several meetings with all insurance companies regarding the development of a public version of telematics insurance… It was Regulator which requested NIA [to initiate the development of a public version of telematics insurance]." (G3)*

Moreover, Insurer T became the first mover in developing and launching telematics insurance in the sector. This triggered other insurance companies to become aware of the telematics insurance concept and a new motor insurance market for it. According to the Deputy Manager from Insurer T, responsible for designing the policies of telematics insurance in the beginning of the service innovation process:

> *"Some [insurance companies] started developing telematics insurance after we submitted it… I know that some insurance companies developed telematics insurance without issuing any telematics insurance policies. It was because their top management teams recognised that they should also participate in this considering telematics insurance was a new type of insurance." (T10-2)*

Codes		Key evidence from data
S1C1. The emergence of advanced technologies in the sector	a. Support from government agencies	*FSC released the FinTech Development Promotion Program in October 2016… One of the focuses was "Encouraging insurance companies to develop innovative insurance product for big data… such as developing diversified telematics insurance applications". (OD-FSC)* *"Outlays by the Financial Supervisory Fund shall be used for the following purposes... 2. Promotion of research and development of financial systems and new types of financial products" (FSC Act)*
	b. Implementation of advanced technologies	*"For financial institutions, that [Internet of Things] means new opportunities for the collection and protection of data… it could add to consumer convenience include… or car insurance rates geared to policyholders' driving behaviour." (Online news article: 3. Nov. 2017)*
S1C2. The entry of first mover		*"When the news broke that we [Insurer T] were preparing to develop the first telematics insurance in Taiwan… other insurance companies were watching us. Meanwhile, they feared that our market share would increase as we develop the first telematics insurance in the market." (T2-2)*

Mechanism (S1M):

Actors started acknowledging the value of telematics insurance. This was demonstrated in an investigation of how telematics technology could help them deal with critical catalytic changes in the insurance sector. The emergence of telematics technology also enabled actors to begin assessing the value of integrating telematics technology into insurance. The regulator considered the value of supporting the development of telematics insurance. It recognised that the success in developing telematics insurance

could be an achievement in response to FSC's encouragement, as noted by a manager from Insurer G, responsible for Insurer G's telematics insurance project management,

> *"The development of telematics insurance can be an achievement for Regulator as the public may view telematics insurance positively and think that Regulator has done a great job [of eliminating the unfair premium calculation]… The public will think that Regulator is open-minded to innovation rather than strictly managing it." (G1-2)*

Insurance companies gathered information and conducted market analysis. Insurance companies studied and analysed the potential value of utilising telematics technology in the insurance sector. As explained by the original project manager of Insurer T's telematics insurance,

> *"There was this time that we were in contact with an international re-insurance company. It shared with us about the concept of telematics insurance… and we further asked the international re-insurance company to provide us more detailed information about telematics insurance…. We then collected cases of telematics insurance, which were provided by more than ten insurance companies abroad. We looked into how they collected those risk factors, what were the approaches or devices they used, and how they developed the pricing model of telematics insurance." (TC)*

Technology firms explored the potential of applying telematics technology in the insurance sector. They recognised that telematics technology could address the issue of unfair premium calculation by collecting and analysing driving behaviour. Hence, they became interested in entering the insurance sector, according to a manager of Tech M,

> *"We had developed nine factors in relation to driving behaviour since adding driving behaviour could improve the accuracy of the calculation of motor insurance premiums." (M1-1)*

Codes	Key evidence from data
S1M1. Conducting studies to understand the potential of telematics insurance	*"We began conducting studies and market research to understand the possibility of telematics insurance… such as in-depth interviews with industry insiders and the public, situation analysis and the local market analysis. We also conducted an analysis on the regulation aspect… since the insurance regulation is quite rigid in Taiwan. We started from gathering reports about the practical aspect of telematics insurance. Then we moved to interviews with consumers and practitioners to understand their perceptions towards telematics insurance." (G1-1)*
S1M2. Examining the application of telematics technology in the sector	*Tech C viewed telematics technology as a new approach to calculate motor insurance premiums based on an individual's driving behaviour collected. (OA)* *Tech M believed the essence of insurance is to uphold social justice that motor insurance premiums should be calculated based on customers' driving behaviour. Tech M aimed to help insurance companies collect and analyse driving data and develop the pricing model of telematic insurance through its telematics technology. It recognised that telematics technology creates business opportunities for motor insurance in Taiwan. (Summarised from M1-1, M1-2, and the 2015 annual report of Tech M)*

Outcome (S1O):

Outcome for regulator:

- A decision made to encourage the development of telematics insurance made by the regulator
- Public version of telematics insurance

Outcome for insurance companies:

- Assessments of the value of telematics insurance
- Final decisions made to develop telematics insurance through the integration of telematics technology into insurance.
- Realisation of lack of technology capabilities by insurers
- Perception of value of telematics insurance as a means to enhance service provision and corporate image by insurers.
- Lack of historical driving data to enable insurers to develop pricing model

Outcome for technology firms:

- Perception of value of telematics insurance as a means to increase the awareness of telematics technology and telematics systems sales by technology companies.
- Recognition by technology companies that are not qualified to operate insurance-relevant activities based on insurance regulations.

Codes	Key evidence from data
S1O1. Assessment of value	*FSC was estimated to have more than ten insurance enterprises willing to invest in and develop products in relation to financial technology by 2020. (OD-white paper)*
	"It [Our market research] made us [Insurer T] realise that telematics insurance not only enables customised insurance premiums… but also allows the provision of various insurance services to our customers." (TC)
	"We are planning to develop and expand our service of big data analysis to industries such as finance and insurance, logistics… By using the mobile application to collect driving behaviour, we will help insurance companies identify target customers, support them with our database, and create business opportunities through innovative motor insurance [such as telematics insurance]" (2017 Tech M annual report)
S1O2. Realisation of the lack of resources after investigation	*Insurer T had insufficient IT human resources and technology capabilities to develop telematics technology. Furthermore, Tech W conducted studies on telematics. The result suggested the accuracy issue of telematics applications. (Summarised from T3-2)* *"The rationale of telematics insurance is about using driving behaviour, time of driving, and driving distance to calculate [insurance premiums]. Nevertheless, at that time no one [insurance company] had comprehensive data [to build the premium calculation model for telematics insurance]." (TC)* *Organisations outside of the insurance sector will not try to become an insurance company because they are not eligible to sell insurance. They must obtain a business licence to conduct insurance activities such as sale of insurance in Taiwan. Additionally, as insurance enterprises they will be supervised and regulated by the regulator. (Summarised from M1-1, G1-1, OR)*

4.3.2 Stage 2: Seeking complementary resources to overcome internal deficiencies

CMO configuration 2 summary: The techniques of telematics technology were new in the sector, and there were internal deficiencies which required actors to obtain complementary resources (S2C). Such a context triggered actors to clarify the adequacy of telematics insurance for the sector and approach potential business collaborators with complementary resources (S2M). Eventually, the regulator authorised the development of telematics technology and actors established collaborative relationships with external business collaborators (S2O).

Context (S2C):

The findings reveal that the techniques of telematics technology were new in the sector. This suggested that the appropriateness of operating telematics technology in telematics insurance remained unknown from a regulatory perspective which required suggestions and permission from the regulator. As noted by the Deputy Manager Insurer T, responsible for submitting the telematics insurance policy to the insurance regulator,

> *"There are different approaches to submit insurance products to Regulator, namely examine-and-approval and use-and-file. We [Actuarial Dept.] suggested going through the examine-and-approval approach since it [telematics insurance] was a very new type of insurance." (T10-1)*

Additionally, there was an impetus in the sector due to internal deficiencies. Internal deficiencies refer to actors having insufficient internal resources such as technology capabilities, qualifications for conducting insurance activities, and data from actors to achieve the development of telematics insurance. Driving behaviour data was required by insurance companies to establish the pricing model of telematics insurance, as described by a Vice President from Insurer T,

> *"Our Actuarial Department was not able to develop the pricing mode of telematics insurance since we did not have historical driving data… Therefore, we obtained driving data from a fleet management company in order to obtain driving data." (T2-CIT)*

Moreover, technology capabilities were viewed as a core skill required in the insurance sector due to the advancement of technologies. As explained by a manager from Insurer T,

> *"To collect driving behaviour, an application programming interface (API) was required to be developed to link systems between the insurance company and the technology firm." (T5-1)*

Codes		Key evidence from data
S2C1. Telematics technology as a new concept in the sector		*"New types of insurance such as telematics insurance had to go through an examine-and-approval approach when submitting to Regulator for approval of sale." (T2-CIT)*
S2C2. Internal deficiencies	a. The impetus to have driving data in the sector	*"The premium calculation model of telematics insurance has never been established. For instance, to what extent do sudden braking, acceleration, driving distance influence the premium calculation?" (C1)*
	b. Requirements of technological capabilities to collect driving data	*"Insurance companies must collaborate with a company which can help them collect and transmit data. They [insurance companies] cannot do it [develop telematics insurance] on their own [with their level of technology capabilities]." (M1-1)*

Mechanism (S2M):

The findings indicate that new concepts in the sector such as telematics technology triggered insurance companies to clarify the design of telematics insurance with the regulator. Insurance companies were uncertain about the regulator's perception toward telematics insurance, they approached the regulator for clarification and sought consent for their design of telematics insurance. Insurance companies presented the design of their telematics insurance or carried out internal audits to align their perceptions of telematics insurance with that of the regulator. As noted by an associate manager from Insurer T,

> *T4 labelled an incident as Communicate with Regulator and said, "We consulted with Regulator regarding the concept of telematics insurance. And Regulator raised questions about the risk factors of our telematics insurance. Then we modified the draft design based on Regulator's opinions. These all happened prior to the reviewing procedure." (T4-CIT)*

In addition, the impetus to acquire the required resources triggered actors to seek complementary resources by approaching potential business collaborators. Insurance companies sought potential business collaborators with driving data or technology capabilities. They explained the rationale of telematics insurance by referring to successful cases implemented in other countries. Additionally, technology firms sought to collaborate with insurance companies to increase the opportunity to sell their telematics systems and devices, according to a manager from Tech M, which eventually collaborated with Insurer T to develop telematics insurance services,

> *"We sought to collaborate with insurance companies and explained our ideas and technology capabilities of data collection and big data analysis for driving behaviour with non-life insurance companies. We not only collect driving data, but we have R and D department." (M1-1)*

Codes	Key evidence from data
S2M1. Clarifying the design of telematics technology	*Telematics insurance did not seem to require prior approval for the sale based on Insurer T's understanding of the regulations. However, Insurer T had experienced and was concerned that Regulator's perception could lead to discontinuation of the development of innovative insurance. Hence, Insurer T presented the design of telematics insurance to check the idea with Regulator. Regulator then raised questions and corrections for the design of telematics insurance, and Insurer T replied and modified the design accordingly. (Summarised from T10-1, T10-2, narratives in T4-CIT, and T5-fieldnote)*
S2M2. Acquiring complementary resources	*Insurer T approached Logistic K to request the collection of driving data for developing the pricing model of telematics insurance since Logistic K was Insurer T's existing business customer. (Summarised from T5-CIT and T2-CIT)* *Insurer T exchanged ideas and assessed the potential co-created value of telematics insurance with several technology institutions and firms. (Summarised from T3-1)* *Insurer G was in contact with several potential business collaborators and attended several meetings to assess all potential business collaborators. (Summarised from G2-NP)*

Outcome (S2O):

Outcome for Regulator:

- Consent authorised by Regulator for insurance companies to develop telematics insurance.

Outcome for insurance companies:

- Regulator's requirements obtained for the design of telematics insurance.
- Decisions made to collaborate with the selected technology firms through combining knowledge of insurance with technology capabilities from technology firms.
- Contract signed for forming collaborative relationships with technology firms to develop telematics insurance.

Outcome for technology firms:

- Decisions made to partner with the selected insurance companies through combining technology capabilities with the knowledge and ideas from insurance companies.
- Contracts and non-disclosure agreements signed to form collaborative relationships with insurance companies and assure insurance companies of the safety of their creative ideas.

Outcome for Logistic K:

- A decision made to provide driving data to Insurer T

Codes	Key evidence from data
S2O1. Formal collaborative relationships established	*Insurer T collaborated with Tech W in the beginning to develop the telematics application since Tech W was an existing business collaborator regarding developing and maintaining Insurer T's official website.* (|Summarised from T2-CIT, T3-1) *"In November 2016, our company collaborated with Tech C to release telematics insurance…" (2016 Annual Report of Insurer T)* *Insurer G decided to collaborate with Tech M since both had collaborated with each other several times. Moreover, Tech M had more authentic data sources and provided wider access to its data. Tech M's long-term participation in the insurance sector provides other potential business collaborators with a rich understanding of insurance companies. In addition, Tech M was highly cooperative and already had a ready-made product, which Insurer G didn't have to worry about in terms of user interface and user experience design.* (G2-2, G2-CIT)
S2O2. Permission to develop telematics insurance granted	Both T2 and T4 drew Regulator at the top of their network pictures. Insurer T only started developing telematics insurance when receiving the permission from Regulator. (Summarised from the narratives in T2-NP and T4-NP)

4.3.3 Stage 3: Combining complementary resources to create the required resources and for reviewing the design of service offerings

CMO configuration 3 summary: Service innovation requires a combination of complementary resources and telematics insurance, as new types of insurance must obtain regulatory approval prior to launch (S3C). Actors started exchanging complementary resources with their business collaborators and went through the reviewing procedure (S3M). Consequently, actors achieved service innovation through the integration of telematics technology into insurance and aligning the design of telematics technology with regulatory requirements (S3O).

Context (S3C):

The development of service innovation is built upon the combination of complementary resources. The knowledge of calculating insurance premiums from insurance companies needs to be combined with external actors which had the technology capabilities of collecting and analysing driving behaviour, as stated in an online news article published in 2016,

> *"The industrial chain of telematics insurance comprises a wide range of organisations such as telematics device providers, insurance companies, system integrators, software companies etc. Therefore, cross-sector integration and value-added services will become the key points for promoting telematics insurance." (Online news article: 19. June. 2016)*

Additionally, the insurance regulations in Taiwan require new types of insurance to be reviewed and approved before they are launched to the market. At that time, telematics technology was a new technique that had never been implemented in the insurance

sector. Moreover, only licensed insurance companies have the right to sell insurance policies under the supervision of Regulator. As explained in Article 16 of Regulations Governing Pre-sale Procedures for Insurance Products established by FSC,

> *"For the following non-life insurance products, an insurance enterprise may commence sale only after applying for and receiving approval from the competent authority, unless otherwise provided by the competent authority: 2) A new type of individual insurance product. Standards for determining what qualifies as a 'new type of insurance product' shall be drafted by NIA and reported to the competent authority [Regulator] for review." (IR5)*

Codes	Key evidence from data
S3C1. Development of service innovation requires a combination of complementary resources	*"Data transmission in telematics insurance was not something insurance companies could solely achieve… Transmitting such huge amount of driving data required technology firms… since insurance companies were not experts in vehicles. Therefore, insurance companies had to either adopt joint ventures or collaborate with technology firms or establish labs for developing insurance technology… Otherwise, organisations in other sectors [which sought to enter the insurance sector] will become competitors for insurance companies." (C1)*
S3C2. Regulatory requirements	*Any type of insurance had to complete its reviewing procedure prior to sale. New types of insurance must be examined by Regulator first and receive approval prior to their sale. (Summarised from archives of insurance regulations and the website of Regulator)* *"It was due to the requirement of insurance regulations that telematics insurance had to be approved [by Regulator] before the launch of it. Therefore, we had to present our design of telematics insurance to senior executives in Regulator… Eventually, it [Insurer T's telematics insurance] was approved." (T7-NP)*

Mechanism (S3M):

The findings reveal that the requirements of combining complementary resources triggered actors to begin exchanging services with their business collaborators. Insurance companies shared their ideas about the design of telematics insurance and the requirements from insurance regulations with their business collaborators. In contrast, business collaborators provided insurance companies with the ability to develop telematics techniques, telematics applications, and telematics devices to collect and analyse driving behaviour. However, during the process of service exchange, knowledge gaps between insurance and technology were encountered by actors, as noted by an Associate Vice President from Insurer T,

> *"It was easier for us [insurance companies] to understand them [technology firms], while it [Tech C] seemed to struggle with understanding our standpoint as an insurance company… It [Tech C] neglected to consider that insurance companies were restrained from insurance regulations since we [insurance companies] were a supervised sector. Sometimes, it just did not seem to understand our situation. We had to explain to it [Tech C] and it had to align the design with regulatory requirements." (T7-2)*

Furthermore, insurance regulations led insurance companies to seek telematics insurance for permission to sell telematics insurance in the sector. The review committee challenged insurance companies with regard to the design and rationale of telematics insurance and offered suggestions. Data security techniques were implemented in both VP_T and VP_G to address the aspect of protecting customers' personal information during data transmission between insurance companies and their business collaborators. Insurance companies shared their understanding of insurance regulations with their business collaborators so that the business collaborators could correspondingly amend their design of telematics technology to meet regulatory requirements. For instance, data masking was implemented in VP_G to ensure data security, as confirmed by a staff, responsible for tasks in relation to the development of Insurer G's telematics insurance services,

> *"When it comes to dealing with customers' personal information… all the registration data with personal information such as ID number, name and birth data in the application were masked. And these masked data will be transmitted to Tech M. Therefore, when customers are using this application, Tech M can only see the masked data and make further calculations. Tech M can only use these driving data to improve the application; however, it would not know our customer types." (G2-1)*

Codes		Key evidence from data
S3M1. Combining complementary resources to exchange services	a. Knowledge sharing	*"Once we [Motor Insurance Department] received the transmitted data of driving behaviour from Tech M, the data was then provided to Corporate Planning Department to develop the pricing model of telematics insurance." (G2-NP)* *Insurer T shared its innovative ideas and offered constructive advice about claiming to Tech C. Tech W provided its techniques of developing applications, while Tech C provided its telematics devices and ability to integrate telematics systems. (Summarised from T4-CIT)*
	b. Knowledge asymmetry	*"To be honest, although we collaborated with Tech M, we cannot thoroughly understand the calculation of Tech M's telematics technology… We cannot grasp Tech M's calculation and I believe this happens to other insurance companies too." (G2-2)*
	c. Concerns about market competition	*"I think that every insurer will want to collaborate with a firm that no one has collaborated with before. If every insurer has its own business collaborator, then they wouldn't have to be worried that some business collaborators may say to their potential consumers, 'Would you like to adopt the approach of one specific insurer accordingly?'. Therefore, some insurance companies may simply just follow what the previous insurance companies did." (G2-1).*

Codes		Key evidence from data
S3M2. Reviewing the eligibility of telematics insurance	a. Complying with regulatory requirements	*T4 wrote down four critical incidents in chronological order. T4 labelled Incident 2 as communicating with Regulator and shared the following narrative. "We [Insurer T] received suggestions from Regulator after the reviewing. And we made adjustments according to the suggestions." (Summarised from T4-CIT)*
	b. Asymmetrical understanding of the design and operation of telematics insurance	*"The concept of telematics insurance was too innovative… that the committee members literally did not know or understand what telematics insurance was about during the reviewing procedure. They raised several weird questions to us [Insurer T]. Eventually, we had to provide examples to help Regulator understand how telematics insurance was achieved. We [Insurer T] had to convince Regulator that our product was reasonable." (T10-1)* *"We [Regulator] may understand explanations of concepts from insurance companies. However, when it was about the operation [of telematics insurance] we could not understand it properly since we used different terms from insurance companies. Therefore, we [Regulator] had to spend more time trying to comprehend what insurance companies were talking about." (R1)*

Outcome (S3O):

Outcome for insurance companies:

- The pricing model of telematics insurance was developed.
- The integration of telematics technology into insurance systems for telematics insurance was achieved.

Outcome for technology firms:

- The integration of telematics technology into insurance systems for telematics insurance was achieved.
- The enhancement of technology capabilities was achieved through feedback received from insurance companies.

Outcome for Regulator:

- Permission to sell telematics insurance from Regulator

Codes	Key evidence from data
S3O1. Achievements in service innovation	*"We achieved the development of our telematics insurance through the integration of driving behaviour into driving distance." (T7-CIT)* *"Customers transmitted [driving data] to the telematics application. We transmitted data to Tech M, and it transmitted the result [of driving behaviour analysis] to us [Insurer G]." (G3-NP)* *"In the aspect of innovative services, the company had achieved the development of driving data analysis and risk factors…" (2017 annual report of Tech M)*

Codes	Key evidence from data
S3O2. Alignment with regulatory requirements to obtain regulatory approvals	*"When it comes to dealing with [protecting] customers' personal information… all the registration data with personal information such as ID number, name and birth data in the application were masked. And these masked data will be transmitted to Tech M. Therefore, when customers are using this application, Tech M can only see the masked data and make further calculations. Tech M can only use these driving data to improve the application; however, it would not know much about our customer base." (G2-1)*

4.3.4 Stage 4: Communicating the value of service offerings to commercialise services

CMO configuration 4 summary: As telematics applications were released and telematics insurance was approved for sale in the insurance market, new types of services were required to be introduced to the market (S4C). Such a situation triggered actors to begin communicating the value of telematics insurance services to their customers and distribution channels and market competition emerged in the ecosystem (S4M). Thereafter, telematics insurance services became available to customers, and actors delivered the value of telematics insurance services to their customers (S4O).

Context (S4C):

Once approvals were received from Regulator, insurance companies became eligible to launch and sell telematics insurance in the market. Telematics insurance services were new for the market. Customers and distribution channels were not familiar with its concept and operation. Despite telematics insurance being able to calculate personalised premiums, customers were not equipped with an understanding of the novel rationale behind telematics insurance, as noted in the fieldnote of a manager from Insurer T,

> *T5 commented that "Since telematics insurance was not offered by any other insurance companies [which means it was a new idea], consumers struggled with understanding the rationale or were concerned about it". (T5-fieldnote)*

Moreover, business customers such as fleet management companies, which were considered potential users of telematics insurance services, did not know much about its application and the reasons to switch from traditional motor insurance to telematics insurance.

Codes	Key evidence from data
S4C1. New services were required to be introduced to the market	*The result of an online survey showed that 98 per cent of the public either had never heard of telematics insurance or did not know much about telematics insurance. (Summarised from an online survey conducted by an automotive website)* *"Once the services of analysing driving behaviour are developed and telematics insurance policies are approved by Regulator, the company will begin with marketing and promotion." (2017 annual report of Tech M)*

Mechanism (S4M):

The availability of telematics insurance as a new type of insurance made actors begin communicating the value of telematics insurance in the sector. Insurance companies introduced telematics insurance through their distribution channels such as insurance brokers, insurance agents, and bank-led distribution channels. Actors worked on popularising telematics insurance services by helping distribution channels become more familiar with the concept and operation of telematics insurance, as noted by a business manager who visited insurance agents and brokers to promote Insurer T's telematics insurance,

> *"When our company had developed a unique type of insurance services, we conducted presentations to not only executives but also salespeople in these insurance agents and brokers so that they could have a better idea of the benefits of our telematics insurance for them." (T6-1)*

Additionally, technology firms communicated the application of telematics services to other insurance companies and to their potential business collaborators in other industries. Furthermore, insurance companies held marketing campaigns to increase customers' willingness to try out telematics applications. They explained to customers that there was a fairer premium calculation approach as well as telling them about the additional claims services that telematics insurance provides. As both stated in the webpage of Insurer G and an online press article published in 2018,

> *An article was posted by Financial Holding G and an online press article which stated, "The calculation of traditional motor insurance rates has reached a new milestone, which is calculated based on driving behaviour. Insurer G has launched telematics insurance this month which provides premium discounts to customers with safe driving behaviour." (WP-Insurer G, Online news article: 27. March. 2018)*

As telematics insurance services were being promoted in the market, other insurance companies became interested in the telematics insurance market. The approval of telematics insurance triggered market competition. Other insurance companies started adopting their own telematics techniques. Additionally, Regulator took this opportunity to encourage the development of insurance technology. It proposed an approach to gather all collected driving data and share the data among insurance companies. That is to say, Insurer T was required to share its telematics techniques with other insurance companies. As described by a manager from Insurer T,

> *"There was a meeting organised by NIA as other insurance companies were hoping that NIA could develop a database which stores driving data collected by all insurance companies [however, so far only Insurer T had collected driving data]. NIA would like us [Insurer T] to share the driving data that we have already collected with others through the database… We [Insurer T] had invested so much money in it [developing telematics insurance], why should we [Insurer*

T] let other competitors use the driving data we have collected? We were not willing to share more than ten thousand pieces of driving data." (T10-1)

However, Insurer T rejected Regulator's proposal since this idea contradicted Insurer T's perceived value of being the first mover of telematics insurance. Insurer T applied telematics technology patents to prevent the techniques of collecting driving behaviour from being adopted by other insurance companies and to delay other insurance companies from entering the market. As explained by a research consultant of IRI,

"After Insurer T started promoting its telematics insurance… NIA once tried to be a mediator between Insurer T [as the first move] and other insurance companies [to convince Insurer T to share the collected driving data] since other insurance companies were interested in participating in the telematics insurance market. However, Insurer T did not want to let other insurance companies and hence it applied several patents [to protect its techniques]… That is to say, Insurer T's patents prevented others from participating in the telematics insurance market." (C1)

Codes		Key evidence from data
S4M1. Communicating the value of telematics services	a. Popularising telematics applications and devices	*"Once telematics insurance was launched to the market, we had to promote it… we had to inform customers about this [new type of insurance] and we also had to inform our distribution channels about it." (G1-2)* *"For example, our salespeople [and distribution channels] did not understand the concept of telematics insurance. Therefore, we had to disseminate the information about how to operate the telematics application." (T2-2)* *T5 commented that it was because no other insurance company had launched telematics insurance that customers misunderstood or were concerned about telematics insurance. Therefore, Insurer T regularly posted videos on its social media accounts to introduce the concept of telematics insurance and clarified that the design of its telematics insurance protected customers' personal information. (Summarised from T5-1)*
	b. Lack of incentives to adopt telematics services	*"Customers must first install our telematics application and let it collect their driving behaviour for around one to three months so that we can calculate insurance premiums for them. While we were running market campaigns, we felt stuck since not many people have downloaded it which resulted in a low sales number of telematics insurance." (G3)* *Although a significant number of Taiwanese customers showed willingness to purchase telematics insurance, many of them were concerned about the expense of buying telematics devices and invasion of privacy. (Summarised from OA)*
S4M2. New actors competing in the market		*"The coordination from NIA failed since insurance companies could not reach a consensus [since Insurer T refused to share the collected data]… Therefore, we [Insurer G] began developing our own telematics insurance." (G3-NP)*

Outcome (S4O):

Outcome for insurance companies:

- Delivery of the value of telematics insurance to customers.
- Enhancement of interactions with customers and distribution channels.

Outcome for technology firms:

- Telematics insurance received more attention from government entities.
- Increased willingness from more organisations to adopt telematics technology.

Codes	Key evidence from data
S4O1. Service provision	*"Many customers thought that our telematics insurance was great including myself… I purchased telematics insurance for my car… It gave me an insurance premium discount of around 15%… because I seldom use my car... This is a great deal for me…" (T2-1)* *"After successfully developing telematics insurance with us [Insurer T], Tech C managed to sell its telematics devices to a fleet management company and other insurance companies… some insurance companies spent a lot of money to buy Tech C's telematics devices..." (T2-2)*

4.3.5 Stage 5: Evaluating the delivered value of service offerings to adjust service offerings

CMO configuration 5 summary: The market response of telematics insurance and different techniques of collecting driving behaviour emerged in the sector (S5C). This triggered actors to begin evaluating the effectiveness of telematics services and legislator intervention (S5M). Subsequently, actors adjusted their design of telematics insurance or strategies of providing telematics insurance services (S5O).

Context (S5C):

The findings show that market response began emerging since customers produced feedback and reported issues around telematics insurance back to insurance companies as they adopted and consumed telematics services. As noted by a business manager of Insurer T during the network picture section,

> *"During the process of providing telematics insurance services to our customers, our Business Section chiefs and Business Section managers gathered the feedback reported by our salespeople, financial channels, and direct customers regarding issues of using the telematics device, the telematics application. Afterwards, the feedback was summarised and reported to the Personal Lines Department at Headquarters so that it [the user experience of Insurer T's telematics insurance] could be improved." (T6-NP)*

Furthermore, other insurance companies began entering the market with their own telematics techniques to analyse driving behaviour, since Insurer T's patents prevented them from having access to their telematics technology. However, some telematics

techniques proved to offer unreasonable premium discounts to attract customers in the market, as explained by a staff from Insurer G who was responsible for the groundwork of Insurer G's telematics insurance,

> *"Additionally, Regulator acknowledged that the direction of developing telematics insurance [other new types of telematics techniques] seems to head towards a different direction to what it [Regulator] had expected." (G2-1)*

Codes	Key evidence from data
S5C1. Market response	*"Customers sometimes called us [Insurer T] to complain about the operation of telematics application… or to report the issues they encountered while using the telematics application… these kind of issues had to be dealt with immediately… which we sought to modify and improve the application." (T1-1, T1-NP)*
S5C2. Entry of new entrants with various techniques	*"Other insurance companies can only adopt our telematics technique if they paid us because of the protection of our patent. It was impossible that they would pay us for the technique. Hence, they developed their own techniques, which some of the risk factors turned out to violate insurance principles." (T1-CIT)* *"Some [insurance companies] utilised telematics insurance to give inappropriate discount to their customers." (C1)*

Mechanism (S5M):

Actors began examining the delivered value of telematics services as issues were identified while telematics insurance was being sold in the sector. Actors identified that certain techniques of collecting driving behaviour violated the principles of telematics insurance. Insurance companies recognised that those inappropriate techniques cannot reflect authentic driving behaviour. Moreover, Regulator called for re-examination of telematics insurance. According to a Section Chief from Insurer T,

> *"Some insurance companies proposed certain techniques of monitoring driving behaviour which seemed reasonable in the early stage of reviewing… Nevertheless, how the quality of its telematics insurance services was managed and controlled by insurance companies was questioned. These insurance companies failed to provide concrete evidence and data to eliminate concerns from Regulator. Hence, Regulator started recognising that telematics insurance was causing a pricing war." (T1-1)*

In addition, consumer response led to actors evaluating the performance of telematics insurance. All actors recognised that telematics insurance was not popularised in the insurance sector. The poor sales number of telematics insurance was acknowledged by not only insurance companies but also technology firms, as described by a manager from Insurer G,

> *"It turned out that current telematics insurance was not effective in Taiwan… No matter whether customers can get premium discount or not, they had to share their data with insurance companies and record their driving behaviour for a certain period of time [three months] in advance. As a result [sales performance] did not look great; it just shows that people did not like this idea." (G3)*

Nevertheless, the phenomenon of actors terminating telematics insurance triggered legislators to interrogate Regulator about the progress of telematics insurance. Hence, Regulator was pressured to solve the issue of inappropriate telematics insurance in the sector, as noted by a Vice President from Insurer T,

> *"There was a legislator who interpellated FSC about the progress of developing telematics insurance, therefore, Regulator required all insurance companies to re-submit their telematics insurance." (Summarised from T2-2)*

Codes		Key evidence from data
S5M1. Evaluating the effect of service innovation	a. Recognising inappropriate telematics insurance techniques	*"Why insurance companies used it [telematics insurance] to compete insurance premiums?… In the end, it just looked like all insurance companies were using telematics insurance to trigger price wars." (R1)* *Regulator recognised telematics insurance was causing premium price wars since certain insurance companies attracted customers by offering [unreasonable] premium discounts through telematics insurance. Regulator believed that such a situation wasn't in consonance with its original purpose based on the regulator's viewpoint. Consequently, the regulator started containing [telematics insurance] by checking whether telematics insurance should be discontinued or terminated. And it became a bit difficult for both sides [insurance companies and Regulator] to cooperate." (Summarised from G2-1)*
	b. Monitoring the performance of telematics insurance	*"When we [Insurer T] are promoting a new product, we would monitor how many policies have been issued and the actual revenue the product has generated." (T8)*
	c. Improving telematics technology	*"When we received feedback from customers regarding the telematics application, we informed Tech W about the issues… once the modification from Tech W's side required us to update to a new version, we had to re-test it again." (T3-NP)* *Tech M proposed improved telematics technology to Insurer G. Tech M's position contradicted Insurer G's defensive strategy. However, Insurer G innovated telematics with minimal risk. (Summarised from G2-1, G3)*
S5M2. Interrogating Regulator by legislators		*"A legislator pointed out that no insurance companies had launched any new types of telematics insurance since June despite FSC aiming to encourage the development of telematics insurance in the FinTech Development Promotion Program in October 2016. The regulator questioned FSC for terminating all types of telematics insurance even if they were previously approved." (Online news article: 7. Nov. 2020)*

Outcome (S5O):

Outcome for Regulator:

- New rules established and announced by Regulator.

Outcome for insurance companies:

- Sales suspended by insurance companies.
- Service innovation strategies shifted from adding more technical functions in telematics applications to removing technical issues in telematics applications and devices.

Outcome for technology firms:

- Resource dependency on insurance companies reduced.
- Strategies of promoting telematics insurance adjusted by technology firms through approaching other insurance companies or potential business collaborators in other sectors.

Codes		Key evidence from data
S5O1. The strategies of service innovation adjusted	a. Sales suspended and resource dependence reduced	*"Since customers did not seem to accept telematics insurance… and Regulator recognised that insurance companies were heading towards a direction which was not as it had expected… Therefore, we had to terminate the sale of telematics insurance." (G2-1)* *"Many insurance companies stopped offering telematics insurance services because they believed they could not change Regulator's perception of telematics insurance triggering premium price wars." (M1-1)* *"In the beginning, Tech C anticipated that it would expand its business in the insurance sector, so it was willing to provide us some free telematics devices… However, it turned out it [the sales number of telematics insurance] was not as expected… And now it is not in contact with us anymore [Insurer T]." (T3-1)*
	b. The strategies of promoting telematics technology adjusted	*Tech C shifted from proactively to passively interacting with Insurer T. Tech C sold its telematics technology to fleet management and motor manufacturing industries. (Summarised from T3)* *Tech C managed to further collaborate with organisations in the motor manufacturing industry and the fleet management industry. (Summarised from T2-2)* *Tech M stopped providing Insurer G with services of analysing and collecting driving data. It moved on seeking potential insurance companies to collaborate with so that Tech M can keep improving its telematics techniques. (Summarised from M1)*
S5O2. New rules established and announced by Regulator		*"Nowadays, insurance companies, which launched new types of insurance related to insurance technology, are just catering to government policies. It was because Regulator established new rules to manage insurance technology since some insurance companies were using telematics insurance for premium price wars. Now with the increase of rules in regulations, most insurance companies become passive in developing insurance technology." (C1)*

4.4 The Process-related Tensions Resulting from Co-existing Institutional Logics and the Corresponding Navigating Practices in the Service Ecosystem

The findings so far have adopted a process perspective. This next section moves on to demonstrate and explain process-related tensions underlying the process and CMO configurations described thus far. These are framed around institutional logics. Hence this set of findings digs deeper to unravel deep-rooted explanations drawing on institutional theory.

Institutional logics are defined as "interdependent assemblages of institutions that facilitate the coordination of activity in ecosystems" (Berthod, Helfen, and Sydow, 2019, p. 319). In this study, institutional logics refer to the rules that guide how actors perceive institutional contexts and interact and exchange services in the development process of service innovation (Geels, 2012). Additionally, the interaction between actors may influence their interactions with other actors involved in the project (Ford et al., 2008). To sum up, institutional logics and institutions facilitate the value co-creation process as value platforms evolve in service ecosystems. Since the development of telematics services is viewed as a process in which resource-related activities were conducted by actors in the telematics ecosystem. Drawing from an institutional lens, institutions and institutional logics serve as a framing for the researcher to unfold the process of resource integration amongst actors in the telematics ecosystem (Jaakkola, Aarikka-Stenroos, and Ritala, 2019).

Based on the five stages of the evolution of value platforms presented in the previous chapter, CMO configurations demonstrate causal explanations of how value platforms evolved in the telematics ecosystem. Contexts of CMO configurations refer to institutional changes which occurred in a service ecosystem that influenced actors' perceptions and the way actors interact and exchange services. In other words, contextual changes refer to changes in institutions. Actors' actions were guided by their existing understanding and perceptions towards the development of telematics services, namely institutional logics. However, divergent actors guided by different institutional logics in the telematics ecosystem experienced tensions. This is because multiple institutional logics were co-existing in the evolution of value platforms. Such tensions resulted from co-existing institutional logics which caused changes in actors' institutional logics. Actors took actions in response to such changes that reshape institutional arrangements and re-configure resources to facilitate new practices required to achieve the development of telematics insurance. Consequently, outcomes

of CMO configurations indicate that intended and unintended value was co-created by actors through the re-shaped norms, rules, and standards shared between actors in the service ecosystem to develop telematics services.

4.4.1 Tensions between societal logic and regulatory logic

In this research, the findings suggest that actors' perceptions and behaviour in the telematics ecosystem were affected by tensions between societal logic and regulatory logic. Table 10 displays the evidence of societal logic and regulatory logic. Societal logic prioritises society's interests by improving social progress and ensuring fairness in society. For example, societal logic aims to provide customers with fairer premium calculation of motor insurance, as described by a manager from Tech M,

> *"While we were discussing with insurance companies, we all considered telematics insurance as an innovation… which we could collect driving data and connect with the databases of insurance companies to develop the pricing model for telematics insurance together … Also, we would like to implement social justice by providing fair premium calculation of motor insurance. For instance, people with high-risk driving behaviour should be charged higher insurance premiums." (M1-1, M1-2)*

In contrast, regulatory logic pays attention to concepts such as managing and controlling actors' behaviour, maintaining market stability, protecting customer rights. For instance, insurance brokers were guided by regulatory logic, which aims to ensure the development of telematics insurance services does not disrupt market stability. According to a business manager from Insurer T, responsible for liaising with insurance brokers and insurance agents:

> *"Some distribution channels do not allow insurance companies to offer and talk about telematics insurance [unique insurance services] since only Insurer T was providing telematics insurance at that time. Insurance brokers and insurance agents aim to offer insurance services from different insurance companies to avoid losing their customers." (T6-1)*

Table 10. Examples of societal logic and regulatory logic

	Category	Representative data
Societal logic	Provide the public with fairer insurance services	*"With the implementation of big data analysis through telematics technology, telematics insurance could provide reasonable premium discount to the insured. This could enable the premium calculation of motor insurance to be more accurate and fairer." (WP-FSC)* *"The development of telematics insurance can be an achievement for Regulator as the public may view telematics insurance positively and think that Regulator has done a great job [of eliminating the unfair premium calculation]… The public will think that Regulator is open-minded to innovation rather than strictly managing it." (G1-2)*

	Category	Representative data
	Integrate financial technology for innovation	*"The value of the development of telematics insurance for Regulator was that the successful development of telematics insurance could represent Regulator's efforts [in supporting financial technology]." (T1-2)* *FSC presented the FinTech Development Promotion Program in 2016… stating that one of the aims was to "encourage insurance enterprises to develop innovative products by applying big data analysis of financial technology. The integration of telematics techniques in insurance could enable the development of diverse types of telematics insurance." (OD-FSC)*
Regulatory logic	Supervise and manage	*The FSC's subordinate agencies, and their work, are as follows: "… Insurance Bureau: Planning and implementing the supervision and regulation of the insurance market and insurance enterprises." (FSC Act)* *"Or at least we had to be able to manage [any relevant activities]. Take the cross-industry alliance among insurance companies and technology firms as an example, Regulator can only manage financial enterprises, but it has no right to manage technology firms. It would have been a relief if we [Regulator] have the right to manage technology firms when issues occur." (R1)* *"When I was involved in the development of telematics insurance, it was noticed that Regulator influenced the process significantly… You could feel that the insurance sector is highly regulated and does not allow insurance companies to do things freely." (T1-2)*
	Maintain market stability	*"Regulator mainly focused on ensuring market stability and no premium price wars. As long as no one made complaints to legislators or supervisory committees that Regulator neglected its duty in managing premium price wars, Regulator would not want to make any changes." (T10-1)*

The findings indicate that tensions between societal logic and regulatory logic occurred in the evolution of value platforms. Diverse actors, such as the insurance regulator, insurance companies, and technology firms, influenced by societal logic recognised the importance of integrating financial technologies in the insurance sector to improve social progress, and offering fairer insurance services in society. Meanwhile, actors influenced by regulatory logic were concerned about market disruption and inappropriate activities in the insurance sector resulting from service innovation. Table 11 demonstrates the evidence of tensions between societal logic and regulatory logic.

Such tensions were encountered by actors when actors were responsible for improving social progress. Meanwhile, they acknowledged that activities and behaviour must be managed and controlled. Actors such as the insurance regulator and technology firms encountered tensions between societal logic and regulatory logic when they were combining complementary resources in Stage 3 of value platform evolution. Societal logic encouraged Regulator to acknowledge that the development of telematics insurance could represent government support of enhancement of financial services on a national level. The government perceived the benefit of advanced technologies as the

ability to provide the public with more choices of motor insurance and a fairer premium calculation of motor insurance. However, Regulator had to play the role of regulatory agency to supervise insurance enterprises by reviewing the appropriateness of the submitted telematics insurance and deciding whether it could be launched to the market. Nevertheless, Regulator was concerned that telematics insurance would disrupt market stability since the concept of insurance technology was new for the market. Such misaligned responsibilities between FSC and the insurance regulator as part of tensions between societal logic and regulatory logic were explained by the CEO of Insurance Agent A:

> *"One of the current issues is that FSC itself has to not only supervise and manage these financial sectors but also promote development. However, the main mission of the four bureaus within FSC is only about supervising and managing the relevant sectors. When these four bureaus are not responsible for promoting development, these four bureaus [including Regulator] would not actively work on promoting research and development of financial systems and new types of financial products… Why should these four bureaus actively promote development when this is not their job content?" (IA)*

Additionally, although technology firms recognised the opportunity to integrate advanced technologies into insurance services, they were not familiar with insurance regulations and did not consider that the insurance sector is highly regulated. This resulted in technology firms experiencing tensions between societal logic and regulatory logic. During Stage 3 of value platform evolution, technology firms realised that their ideas around the pricing of telematics insurance premium were not applicable since the design of the pricing was regulated in the insurance sector. For instance, a mechanism originally developed by Tech C in VP_T was not applicable to insurance regulations which shows Tech C's insufficient knowledge to provide insurance services. As noted by an Associate Vice President of Insurer T,

> *"Tech C had specific ideas for developing telematics insurance. For example, Tech C thought that a rebate mechanism could be implemented in telematics insurance… Nevertheless, Tech C was not aware that the insurance sector is a regulated industry in which the pricing of telematics insurance is carefully managed…" (T7-1)*

Providing fairer insurance services while maintaining market stability was another tension experienced by actors. In Stage 4 of value platform evolution, insurance agents and brokers experienced tensions since telematics insurance was a unique product that created potential uncertainties in a stable market. Although telematics insurance services could provide fairer insurance premiums to customers, the goal of insurance brokers was to maintain their own customer base by offering a wide range of insurance services. Most insurance agents and brokers did not actively promote Insurer T's telematics insurance to their customers since telematics insurance could influence the

decision of insurance agents' and brokers' customers in selecting motor insurance services, as stated by a business manager of Insurer T:

> *"Some distribution channels do not allow insurance companies to offer and talk about telematics insurance [unique insurance services] since only Insurer T was providing telematics insurance at that time. Insurance brokers and insurance agents aim to offer insurance services from different insurance companies to avoid losing their customers." (T6-1)*

Moreover, Regulator managed and supervised the insurance sector by conducting regular financial examinations to evaluate diverse types of insurance which were provided in the market. That is to say, the effect of telematics insurance was to be closely monitored by Regulator to ensure market stability. However, as new types of telematics techniques started offering an improved pricing model of motor insurance, competition in premium calculation created a potential disruption of market stability. Regulator began recognising an evolving price war of telematics insurance premiums which contradicted Regulator's role to ensure market stability. Such changes in market conditions resulted in a change in Regulator's perception, from encouraging insurance technology to questioning the appropriateness of certain telematics insurance policies. According to an online news articles published in 2020, when a legislator questioned the progress of offering telematics insurance services in Taiwan:

> *"During an interview, the legislator emphasised that FSC has earned recognition for providing telematics insurance services… However, it is also anticipated that FSC should move with the times… The legislator indicated that FSC is currently facing a difficult problem in that it has to not only protect customers but ensure no insurance companies employ telematics insurance to trigger price wars." (Online news article: 7. November.2020)*

Table 11. Tensions between societal logic and regulatory logic in the evolution of value platforms

Tensions	Representative data
Misaligned responsibilities between FSC and Regulator	*Our attitude [towards innovation] used to be very closed and conservative in that we didn't communicate with insurance companies. We used to be very strict and inflexible in the past. Nevertheless, now we have to slowly start communicating with insurance companies… due to changes in the environment. Sometimes, [changes in] the environmental conditions [the society and government] forced us [Regulator] to roll out such products in order to meet the corresponding requests [from the public or government policies]. (R1)* *"As the government aimed to promote telematics insurance, it pressured Regulator to consider allowing the integration of advanced technologies into insurance. Hence, Regulator supported us to develop telematics insurance at the time we [Insurer T] submitted the first telematics insurance to Regulator." (T10-2)*

Tensions	Representative data
Unable to predict the evolution of financial technology	Regulator had to fulfil its role of promoting insurance technology in response to support FSC's standpoint of promoting FinTech in the insurance sector. Meanwhile, it had to judge the appropriateness of telematics insurance in the reviewing process and decide whether to give approvals. Regulator was concerned that telematics insurance may significantly change the nature of the motor insurance market and customers' perceptions of motor insurance.
Not familiar with insurance regulations	*"Sometimes our schedule of developing telematics insurance was not as expected. Take the telematics application for example: Tech W initially set driving distance and the corresponding discount." (T7-2)* *"There were times when we possessed different opinions from Tech M… Although Tech M had already developed a telematics application, it had to fulfil our requirements for member registration and encryption." (G2-1)*
Disrupt the stable market	*"There were many times that insurance brokers and insurance agents did not welcome insurance companies providing unique insurance services since this would potentially lead to customers preferring specific insurance companies." (T6-1)*
Emergence of new telematics techniques	*"From Regulator's viewpoint, telematics insurance as a new concept in the market [which made changes in the market] would be troublesome. Fewer changes indicate easier management and supervision from Regulator… Nevertheless, some telematics techniques seem to be causing premium price wars at the moment. Regulator had to jump in to deal with this situation… Regulator had to walk a fine line. It had to make the public recognise that it's making an effort; however, it also had to manage the issue without significantly influencing the market." (G1-2)* *"Some insurance companies proposed certain techniques of monitoring driving behaviour which seemed reasonable in the early stage of reviewing… Nevertheless, how the quality of its telematics insurance services was managed and controlled by insurance companies was questioned. These insurance companies failed to provide concrete evidence and data to eliminate concerns from Regulator. Hence, Regulator started recognising that telematics insurance was causing a pricing war." (T1-1)*

4.4.2 Navigating practices of tensions between societal logic and regulatory logic

Table 12 shows examples of navigating practices for the tensions between societal logic and regulatory logic. Actors navigated the tensions between societal logic and regulatory logic by applying effectual decision-making techniques, boundary-drawing mechanism, and demonstrating adaptation. Applying effectual decision-making techniques allowed actors to use their resources in hand to manage unpredictable service innovation and ensure a controllable risk. When actors were unable to predict the evolution of financial technology, it prompted actors to utilise their existing resources. For instance, Regulator assigned intermediaries to initiate the development of public versions of telematics insurance in Stage 1 of value platform evolution which could bring all insurance companies to adopt the same telematics technique and database. As noted by a Section Chief from Insurer G, responsible for project management of Insurer G's telematics insurance:

"At that time, NIA had organised several meetings with all insurance companies regarding the development of a public version of telematics insurance… It was

Regulator which requested NIA [to initiate the development of a public version of telematics insurance]." (G3)

This approach would enable Regulator to completely control the direction of the development of telematics insurance. Nevertheless, the projects of the public version of telematics insurance all failed to attract insurance companies which resulted in insurance companies developing their own telematics techniques respectively.

In contrast, boundary-drawing mechanism was adopted by actors to navigate such tensions since it enabled actors to draw boundaries of resources and values among actors. For example, communication channels were established to facilitate prompt interactions between Regulator and insurance companies during the development process. Instead of Regulator only playing its regulatory role after insurance companies had completed the design and submitted insurance policies, Regulator and insurance companies became involved in discussing regulations around service innovation. This allowed Regulator to not only support insurance companies to successfully develop telematics insurance, but also ensure a certain level of supervision and management along the development process. According to a staff from the insurance regulator, responsible for coordinating all the fintech-related tasks with insurance companies:

"We [Regulator] assigned a team as a channel for insurance companies to communicate with us. If insurance companies encountered any issues during the development process, we would be able to signpost them [insurance companies] to what needs attention or what's inappropriate and shouldn't be done." (R1)

Moreover, insurance companies were able to clarify questions of regulations for service innovation to address the unwritten regulations and rules prior to the submission for reviewing. In addition, when the market stability was disrupted, actors established new rules and regulations for service innovation. The established guidance specifically for new service offerings enabled actors to still offer new service offerings if they address the established rules in the design of new service offerings rather than completely terminating service offerings.

Lastly, navigating the mechanism of demonstrating adaptation was applied by actors to address the tensions between societal logic and regulatory logic. When the newly developed service offerings were new for certain actors, other actors familiarised them with the new service offerings. For instance, insurance companies communicated with their distribution channels such as insurance agents and insurance brokers by conducting presentations to explain the benefits of telematics insurance for all parties. Also, training programmes were implemented to help distribution channels understand the benefit of telematics insurance services for themselves. Therefore, telematics insurance services were able to be broadly distributed to all types of channels.

Furthermore, when the design of new service offerings did not take regulations into account or failed to address regulations, actors demonstrated adaptations by complying with regulatory directions and adjusting their strategies of service innovation. Take Tech M in Stage 5 for instance, it shifted from actively promoting the concept of adding driving behaviour to complying with the insurance regulator's direction when the regulator started acknowledging telematics insurance triggering price wars, according to a manager from Tech M:

> *"We [Tech M] believed that the driver's driving behaviour should be considered as a risk factor in motor insurance. However, adding such risk factor requires the support from Regulator and insurance companies. And now it looks like Regulator does not support such an idea. Hence, it cannot be done despite eight out of 13 or 14 insurance companies supporting such an idea." (M1-1)*

Table 12. Evidence of navigating practices for the tensions between societal logic and regulatory logic

Navigating mechanism	Navigating practices	Representative data
Applying effectual decision-making techniques	Not trying to predict innovation	*"Since we [Regulator] cannot predict how financial technology would evolve in the future and to what extent we can manage it, we can only act accordingly. We have to gradually accept the notion of financial technology [as long as we can accept it]. If the innovation is something acceptable, then we will allow it to proceed." (R1)* *"The development of telematics insurance is the first time insurance companies and Regulator have faced such innovation, and we are all learning. If we [Regulator] don't know anything about financial technology, then we cannot control and monitor it." (R1)*
	Promoting standardised telematics insurance through intermediaries	*"The standpoint of Regulator is always that it did not want significant fluctuation or changes [in the market]. Therefore, it tried to standardise the design of telematics insurance by assigning IRI and NIA to develop public versions of telematics with insurance companies… but projects of developing public versions of telematics insurance all failed eventually… And that's why we [Insurer G] decided to develop telematics insurance on our own." (G1-1)*
Boundary drawing	Establishing communication channels	*"Since telematics insurance was a really new concept at that time… Once we had decided to develop telematics insurance, we consulted with Regulator in advance [regarding whether Regulator could accept the concept of telematics insurance]. If Regulator could not accept such concept, then there is no need to even submit our telematics insurance for reviewing." (T10-1)*
	Establishing new rules and regulations	*"In the official document sent from Regulator, it announced a re-examination of telematics insurance to call for modifying the design of telematics insurance. As existing telematics insurance is provided as insurance riders, Regulator required all insurance companies to*

Navigating mechanism	Navigating practices	Representative data
		design telematics insurance as a primary cover." (T10-2) *Although our previous telematics insurance is currently terminated due to the announcement from Regulator, we are still working on developing another new type of telematics insurance because Regulator is still hoping that an authentic telematics insurance could be developed. What Regulator meant by an authentic telematics insurance is the use of a wide range of driving behaviour risk factors such as hard braking and accelerating [since previous telematics insurance only adopted a few driving behaviour risk factors]. (G2-2)* *"As technologies are advancing rapidly, there is a trend that it is always technologies that come into play first which makes Regulator realise that current regulations are not suitable for managing insurance technology. Therefore, Regulator always establishes regulations by trying to catch up with changes of technologies." (C1)*
Demonstrating adaptation	Implementing training programmes	*"When our company had developed a unique type of insurance services, we conducted presentations to not only executives but salespeople in these insurance agents and brokers so that they could have a better idea of the benefits of our telematics insurance for them." (T6-1)* *"We implemented training programmes to our distribution channels such as insurance agents and insurance brokers. In the training programme, the origin and rationale of telematics insurance, its benefits for customers, and its benefits for them as insurance agents and insurance brokers were explained." (T8)*
	Adjusting strategies of service innovation	*"Now that the new rule was established for telematics insurance… Since we [Insurer T] have not modified the design of our telematics insurance policy accordingly, we are just providing telematics services as renewals." (T7-2)*
	Complying with regulatory directions	*"We [Insurer T] requested Tech C to provide the information around its domain privacy protection of telematics insurance. Since telematics insurance involves data transmission, domain privacy protection was considered as an important aspect during financial examination… Tech C had to keep providing whatever documents were required during financial examination." (T1-CIT)* *"We managed to figure out an appropriate solution to deal with member registration and encryption after communicating with Tech M." (G2-1)*

4.4.3 Tension between innovation logic and market logic

In this study, the findings suggest that actors' perceptions and behaviour in the telematics ecosystem were affected by tensions between innovation logic and market logic. Table 13 illustrates the evidence of innovation logic and market logic during the development process of telematics insurance. Innovation logic refers to firms' organisation towards developing new types of services and implementing innovative

and novel technologies into existing services. Market logic pays attention to concepts such as cost-efficiency, protecting existing market share, and market competition. For instance, insurance companies competed with each other in the insurance sector regarding the diversity of insurance services being offered to customers, as explained by an Associate Vice President from Insurer T:

> *"What I can be certain of is that they [other insurance companies] did not actively invest in it [developing telematics insurance]. Why would those top insurance companies develop telematics insurance? It was because they [top insurance companies] acknowledged that they must develop telematics insurance since small insurance companies had already developed it." (T7-1)*

Table 13. Examples of innovation logic and market logic

	Category	Representative data
Innovation logic	Opportunity to offer new types of motor insurance services	*"The reason why we [Insurer T] decided to develop telematics insurance was because the market did not have this type of insurance, and we viewed it as a business opportunity. Additionally, it [the concept of telematics insurance] was aligned with the development of financial technology for the future. Hence, we started developing telematics insurance." (T4)* *"We also received voice [demands] from the public… Our salespeople received complaints from customers that the motor insurance premium they were charged was too expensive even though they barely used cars."* (G1-2)
	Implementation of telematics techniques in other sectors	*Telematics technology emerged as a new approach to calculate insurance premiums based on an individual's driving behaviour collected through telematics devices. (OA- interview with CEO of Tech C)* *"The service offered by Tech C allows the analysis of driving behaviour by providing the hardware and software to insurance companies…Tech C expected to attract more than 300,000 users to adopt its telematics application." (Online news article: 4. Aug. 2016)*
Market logic	Cost-efficiency	*"The perception of insurance companies towards information technology is relatively conservative… which means insurance companies make relatively small investments in IT human resource, hardware, and software compared to organisations in the technology industry." (T3-2)*
	Protect existing market share	*"Many insurance companies were not familiar with telematics insurance services… most insurance companies did not want changes to happen to their current insurance revenue of traditional motor insurance and their market share." (Online magazine article: 30. Jul. 2021)*
	Market competition	*"After Insurer T announced the launch of telematics insurance… as you know the nature of market competition… our top management team thought that we should also develop something similar since we are a top insurance company." (G2-1)*

The findings indicate that the tensions between innovation logic and market logic occurred in the evolution of value platforms. Although all actors in the telematics ecosystem driven by innovation logic acknowledged the value of providing innovative

services to their end users, actors experienced concerns about cost of investment, market hierarchy, and knowledge and information sharing. Table 14 exhibits examples of evidence from the tensions between innovation logic and market logic.

A key type of tension between actors was that the benefits of telematics insurance services would be experienced by diverse actors in the telematics ecosystem, while the cost of developing telematics insurance solely would cause financial stress for organisations and the profits of telematics insurance remained uncertain. When actors were investigating the value of service innovation, actors had to invest in their resources in advance without knowing how the market would react to telematics insurance services. Actors in innovation logic viewed the provision of telematics insurance services as a potential solution to provide customised motor insurance premiums through the application of Internet of Things. Nevertheless, actors faced the challenge to innovate telematics insurance in advance without the ability to predict the outcome. This suggests a conflict between innovation and market logics. Insurance companies used to develop new types of insurance solely within the organisation to secure their competitive advantage, yet the cost of technology integration for telematics insurance was unpredictable. As noted in an online news article published in 2016:

> *"The difficulty with financial technology is that when the FSC was actively encouraging [the integration of financial technology in insurance], but most insurance companies did not seem interested… It was because providing telematics devices may cost insurance companies more than NT$10 million, and they could not predict the profit of telematics insurance…" (Online news article: 13. May. 2016)*

The integration of telematics technology in insurance could advance the premium calculation approach of traditional motor insurance by collecting and analysing individuals' real-time driving behaviour. Moreover, the pricing model of the traditional motor insurance was considered unfair as the risk factors of personal information and vehicle information failed to demonstrate how a vehicle was used. However, the factors used in telematics insurance was different from that of traditional motor insurance. In other words, a new pricing model had to be established and for risk factors of driving behaviour in telematics insurance.

Furthermore, actors in different hierarchies experienced the tensions between innovation logic and market logic. The entry of first mover indicated a new market of telematics insurance had emerged. Insurance companies were aware that innovation activities demonstrate a company's ability to keep up with trends and changes in the sector. Actors with relatively small market share perceived the launch of new types of insurance as an opportunity to enhance their market share by incorporating novel

concepts into traditional motor insurance. However, they faced the challenge of having limited resources to invest in innovative insurance services. In contrast, actors with a relatively large market share began experiencing concerns about their corporate image of providing innovative insurance services and the potential negative impact on the insurance revenue of their traditional motor insurance. For top insurance companies, introducing new concepts such as telematics technology into insurance can create uncertainties for its market share. Top insurance companies used to be conservative towards service innovation since their primary goal was to secure its high market share. However, the entry of first mover had changed the way they perceived service innovation since they did not want to be excluded from the market, as described by a CEO of Insurer Agent A:

> *"When Insurer T became the first to launch telematics insurance, an executive from a top insurance company told me that the top management team questioned them why they were not the first mover and they felt embarrassed [for not being the first mover in the market]." (IA)*

Additionally, the provision of telematics insurance services depended on actors' exchanging services to generate new resources, while exchange activities during the development process triggered actors' concerns about market competition. For example, although Insurer T had to exchange services with Tech C to advance services, Insurer T became concerned that Tech C may leak the shared knowledge and information to actors' competitors which could result in damage to their competitive advantage. As noted by a Vice President of Insurer T:

> *"Of course, we were concerned that Tech C will share this information [with other insurance players]. It is impossible that Tech C was only in contact with us. After all, we are neither a leading insurance company nor the biggest one." (T2-1)*

Table 14. Examples of tensions between innovation logic and market logic in the evolution of value platforms

Tensions	Representative data
Innovation versus cost-efficiency	*"We [Insurer T] were not afraid of investing for innovation; however, our biggest worry was that the result of telematics insurance may not be good enough." (T7-1)* *"The insurance sector is highly regulated and FinTech companies have to meet certain requirements such as a minimal capital requirement in order to enter the sector." (R1)*
Threat of corporate image in innovation	*"We [Insurer G] don't want to let people think that we, as a top insurer in the market, did not have the ability to develop this new type of insurance [telematics insurance]. We want to create an image that we are growing together with technology advancement… Normally, we prioritise securing our market share, but we don't want to let people think that we are too rigid to innovate." (G1-1)*

Tensions	Representative data
Knowledge and information sharing	*"All technology firms were confident about its telematics technology, but not even one was willing to reveal the mechanism of calculation. It was this moment that makes me feel relatively weak of insurance companies developing applications." (G2-CIT)* *"Now that other insurance companies were suggesting that our [Insurer T] collected driving data should be shared among insurance enterprises… We [Insurer T] had invested so much money in it [developing telematics insurance], why should we [Insurer T] let other competitors use the driving data we have collected? We were not willing to share more than ten thousand pieces of driving data." (T10-1)*

4.4.4 Navigating practices of tensions between innovation logic and market logic

Table 15 demonstrated examples of navigating practices for the tensions between innovation logic and market logic. Actors navigated the tensions between innovation logics and market logics by applying effectual decision-making techniques and boundary-drawing mechanism. Applying effectual decision-making techniques enabled actors to ensure a controllable risk and minimise the investment of resources for service innovation. Internal deficiencies, such as limited budget, technology capabilities, and qualifications triggered actors to seek to collaborate with external business collaborators with complementing resources. Such deficiencies became incentives for actors to acquire complementing resources and integrate their existing resources to achieve the implementation of telematics technology in insurance, as explained by a manager from Tech M.

> *"Telematics insurance services involve hardware and software to collect driving behaviour… These [hardware and software] require cost of investment which motivated insurance companies to collaborate with external organisations, which can provide an approach for them to collect driving behaviour." (M1-1)*

Eventually, actors established collaborative relationships with their existing business collaborators to combine their existing resources with that of external business collaborators. By forming collaborative relationships with their existing business collaborators, the existing business collaborators offered insurance companies a sense of control, as actors would at least have a certain understanding of their business collaborators due to their previous collaboration experiences. Actors acknowledged that they could manage the cost of investment within a controllable level by combining their existing resources with the complementary resources owned by external business collaborators. In VP_G, Insurer G collaborated with Tech M due to their long-term collaboration relationship and Tech M's technological capabilities, according to a manager from Insurer G:

> *"The reason why we decided to collaborate with Tech M was that it has been a trustworthy partner for storing data for all insurance companies [including*

Insurer G]… Additionally, it had previous experience in participating in the development of the public version of telematics insurance." (G2-2)

Moreover, while facing the concerns between corporate image towards innovation and negative impact on cost-efficiency, actors with a relatively large market share decided to develop telematics insurance by minimising investment and managing affordable losses. This approach allowed actors to enhance their corporate image of innovation with minimal financial impact, as explained by a CEO of Insurance Agent A:

"Most insurance companies used it [the development of telematics insurance] to enhance their corporate image by showing that they were able to develop telematics insurance. However, they did not intend to sell telematics insurance since they were concerned that selling telematics insurance may reduce their motor insurance premium income." (IA)

In addition, practices were adopted by actors to draw boundaries around the resources in the ecosystem. Formal practices of relationship building such as signing agreements ensured that all actors would commit to their roles during the development process, while applying patents divided information and knowledge access through patent protection. As stated in an online news article:

"Non-life insurance companies have been actively applying patents for financial technology. Currently, Insurer T has obtained four patents, ranking the top for the time being… Insurer T is the first in the non-life insurance sector to obtain patents for technological innovation, and has also obtained four patents, including telematics..." (Online news article: 27. Feb. 2018)

Furthermore, actors demonstrated adaptation when facing poor market response. They used the reason of poor sales performance to reject proposals from technology firms, to enhance the quality of telematics insurance and to terminate collaborative relationships. For example, the sales number of Insurer T's telematics insurance did not meet Tech C' expectation, hence, Tech C gradually reduced interactions with Insurer T, as noted by a Section Chief in Information Technology Department of Insurer T:

"In the beginning, Tech C anticipated that it would expand its business in the insurance sector, so it was willing to provide us some free telematics devices… However, it turned out that it [the sales number of telematics insurance] was not as expected… And now it is not in contact with us anymore [Insurer T]." (T3-1)

Table 15. Evidence of navigating practices for the tensions between innovation logic and market logic

Navigating practices		**Representative data**
Applying effectual decision-making techniques	Forming collaborative relationships	*"Telematics device is a must for collecting driving behaviour… Tech C was already collecting driving behaviour through its telematics system and telematics device… Tech C happened to have the technique while we [Insurer T] had to figure out a way to collect data." (TC)* *"In the end, we had to select the business collaborator which offered the most benefits to us [Insurer T]. We*

Navigating practices		Representative data
		decided to collaborate Tech C because Tech C was willing to offer some free telematics devices to us." (T3-1) *"In comparison with other firms, we may get more accurate data from Tech M. In addition, Tech M was highly cooperative and already had a ready-made product. We didn't have to worry about user interface and user experience design. Hence, we [Insurer G] decided to collaborate with it [Tech M]." (G2-2)*
	Set staged goals for flexibility	*"The development of telematics insurance service was set as staged goals so that we could adjust our strategies of innovation flexibly according to the performance of telematics insurance." (Summarised from T2-CIT)*
	Minimising investment and managing affordable losses	*"The result of our investigation suggested that it [telematics insurance] was not worth a significant amount of investment… and it would cause a negative impact to [the insurance revenue of] our traditional motor insurance… Therefore, we adopted a defensive marketing approach. We launched telematics insurance to let people know that we can provide it, but we did not allocate budget for marketing it." (G1-1)* *"Most insurance companies used it [the development of telematics insurance] to enhance their corporate image by showing that they were able to develop telematics insurance. However, they did not intend to sell telematics insurance since they were concerned that selling telematics insurance may reduce their motor insurance premium income." (IA)*
Boundary drawing	Selective revealing	*Although we collaborated with the business collaborators for their techniques, we kept the know-how and core information within the company. We did this because we were concerned that if we share the core information with our business collaborators, they may approach other insurance companies [for collaboration]. This information may not be suitable for other insurance companies. However, they can still take advantage of us to a certain extent. (TC)*
	Relationship building	*Actors signed non-disclosure agreements before they began the collaboration process.* *Up to now, we still keep in touch with Tech C. We have organised regular lunch gatherings… This is very important. Sometimes if we haven't been contacted for two or three months, we will then request Tech C to contact us. Even if there is nothing to discuss, we will request it to join [lunch gatherings] and exchange ideas." (T2-1)*
	Patent protection	*"We were granted for ten years of the patent right. Thus, other insurance companies cannot utilise it even if they want to [enter the telematics insurance market]." (T2-1)*
Demonstrating adaptation	Use poor sales number to reject proposals from technology firms	*"We utilised the development of telematics insurance as a pilot round which conformed to Regulator's direction… As we collaborated with Tech M… but the sales number of our telematics insurance gave us a reason to let Tech M know that we decided to terminate it… And now since we terminated telematics insurance, Tech M no longer offers services in relation to telematics insurance to us." (G3)*

4.4.5 Tensions between service provision logic and boundary-setting logic

In this study, the findings suggest that actors' activities and perceptions in the evolution of value platforms were affected by tensions between service provision and boundary-setting logics. Regulations influenced the way actors manage and present the service provision of telematics insurance in the market. Table 16 indicates evidence of tensions between service provision logic and boundary-setting logic. Service provision logic refers to actors' organisations in terms of providing service offerings to customers, while boundary-setting logic pays attention to the regulatory requirements for developing and providing services. Actors must secure business licenses to be eligible to provide insurance services to customers based on insurance regulations. In addition, the insurance services provided to customers were required by insurance regulations to protect customers' rights.

Moreover, such tensions had been experienced by actors while actors were combining complementing resources in Stage 3. For instance, insurance companies relied on their business collaborators to collect and analyse the data for them, while having to comply with insurance regulations to ensure information security to protect the data generated by customers. Due to technology advancement, insurance companies relied on telematics technologies of technology firms to analyse customers' driving data through collecting customers' personal information and their driving behaviour. In the meantime, the data transmission of driving behaviour among actors triggered the demand to ensure safeguards for customers' personal information and privacy. As explained by a manager from Insurer G, responsible for project management of developing Insurer G's telematics insurance:

> *"The only concern for insurance companies in innovation is the regulatory restrictions such as personal information. It is because of the restrictions from the regulation that we [insurance companies] cannot provide things like personal information to our business collaborators. Moreover, insurance companies are not allowed to be in touch with business collaborators to a certain extent. This is a relatively big problem for us while facing external collaboration." (G1-1)*

Furthermore, telematics insurance services were required to go through a reviewing procedure according to insurance regulations. Regulator as the regulatory agency was responsible to evaluate the eligibility of telematics insurance services in order to grant approvals for sale. However, existing insurance regulations may not be applicable to manage such new types of insurance services since telematics technology was a new concept in the insurance sectors. Due to the increased usage of applications in the insurance sector, tensions emerged around protecting consumer rights while integrating financial technologies in information systems. It was acknowledged that there were

insufficient rules for managing information security in the insurance sector. Such lack of regulatory guidance for telematics insurance indicated that existing insurance regulations were not suitable for managing new types of insurance, as described by a deputy manager of Insurer T:

> *"Even though telematics insurance policies didn't require prior approval based on the regulation at that time, it involves financial technology and was a new and emerging concept… It is Regulator who interprets regulations… We had several experiences in which the regulator made us discontinue insurance policies which did not even violate regulations… Although insurance regulations are pre-determined, these regulations may be outdated for managing new types of insurance and regulating advance technology implemented in insurance." (T10-2)*

Moreover, while technology firms aimed to provide innovative solutions in the insurance sector, the insurance regulations set regulatory boundaries for them to achieve such goals since actors must obtain licenses to be qualified to conduct insurance activities. In other words, the regulatory barrier prevented direct entry from actors outside the insurance sector. For example, the regulatory barrier was echoed by written insurance regulations and a manager of Tech M who stated that technology firms could not operate insurance businesses since they were not licensed organisations. Additionally, external actors had to be managed and supervised by Regulator in order to operate insurance businesses according to insurance regulations.

> *"We [Insurer G] wouldn't want to compete with them [insurance companies] since we [technology firms] are not eligible to sell insurance." (M1-1)*

> *"An insurance enterprise may not commence operations unless it has received permission from the competent authority, completed establishment registration, posted bond, and secured a business licence in accordance with the law." (IR2)*

Table 16. Examples of tensions between service provision logic and boundary-setting logic in the evolution of value platforms

Tensions	Representative data
Data transmission involves information security issues	*"We [Regulator] are not against opening up to innovation; however, we have to protect whatever we [as the regulatory agency] have to protect such as consumer rights." (R1)* *"Outlays by the Financial Supervisory Fund shall be used for the following purposes: 1. Promotion of research on systems for protecting the rights and interests of depositors, investors, and insured parties." (FSC act)*
Lack of regulatory guidance for insurance technology	*"The challenge insurance companies encountered was that to what extent the Regulator can accept [telematics service innovation]… Since insurance enterprises hadn't started selling telematics insurance, we [Regulator] couldn't know whether it's good or bad. Therefore, we [Regulator] agreed that these insurance companies can work on it first. If they [insurance companies] still want to upgrade [telematics insurance products], then we can further examine or review to decide whether to approve those upgraded products." (R1)*

Tensions	Representative data
Regulatory restrictions and barriers for service provision	*"From insurance companies' standpoint, they hope that Regulator could be as open to financial technology as possible so that it makes their innovation process easier. However, from a regulatory agency's standpoint, we [Regulator] can open up as long as you [insurance companies] have ensured the follow-up measures are well designed and executed." (R1)* *"When Regulator tells you [insurance companies] which areas it hoped insurance companies could develop in insurance technology, and you have to follow its guidance. If you go against it, even if you have invested a lot of money… For instance, some insurance companies had already spent a lot of money on investment. However, Regulator just discontinued the insurance product since they didn't follow the direction of Regulator." (T1-1)*

4.4.6 Navigating practices of tensions between service provision logic and boundary-setting logic

Table 17 displays examples of navigating practices for the tensions between service provision logic and boundary-setting logic. While actors were investigating the value of service innovation in Stage 1, the regulatory barriers of qualification to conduct insurance activities resulted in actors applying effectual decision-making techniques. External actors forming collaborative relationships with insurance companies to obtain the qualification. For instance, Tech M formed collaborative relationship with Insurer G in VP_G since Tech M required the eligibility from Insurer G to directly provide insurance services, as noted by a manager from Tech M and a manager from Insurer G:

> *"We wouldn't want to compete with them [insurance companies] since we [technology firms] are not eligible to sell insurance." (M1-1)*
>
> *"It [organisations outside of the insurance sector] will seek to collaborate with insurance companies to enter the market. It won't try to become an insurance company because it has to be supervised and regulated by Regulator while being an insurance company." (G1-1)*

When seeking complementary resources for developing telematics insurance services, actors adopted boundary drawing mechanism to navigate tensions between service provision logic and boundary-setting logic. Since the concept of insurance technology was still new for insurance regulations in Stage 2, actors were not sure how Regulator would view telematics insurance services in the reviewing procedure. Hence, actors used boundary drawing mechanism by communicating with the insurance regulator prior to and within the process of developing telematics insurance to figure out the bottom line for all parties. This approach enabled actors to minimise the risk of regulatory uncertainties. Since Regulator could not predict which direction of insurance technology would emerge, insurance companies discussed and exchanged understanding of telematics insurance with Regulator by making presentations to explain their utilisation of telematics technology into insurance. Regulator gained the

knowledge of telematics insurance and how telematics technology would be implemented in insurance and provided recommendations for insurance companies to improve the design of their telematics insurance. In other words, actors drew the line of service innovation together with Regulator.

When the result of service provision was significantly influenced by the decisions made by the regulatory agency, actors navigated the tensions between service provision logic and boundary-setting logic through the mechanism of demonstrating adaptation. When in Stage 3 of value platforms evolution, actors demonstrated adaptation through aligning their design of telematics insurance with regulatory requirements. For instance, Insurer T consulted with Regulator as a precaution before the initiation of developing telematics insurance services. This allowed actors to acquire suggestions from the regulatory agency so that they could address regulatory requirements during the designing process without being rejected in the reviewing procedure.

> *"We [Insurer T] had learned from our previous experiences to check with Regulator before the initiating development since insurance companies are all under the supervision of Regulator. Since telematics insurance belonged to financial technology and telematics technology seemed to change the way we design insurance policies [and we were not sure how Regulator would interpret it], our CEO made a presentation [of our telematics insurance] to Regulator before we initiated the development." (T10-2)*

Additionally, when the provision of telematics insurance service required the approval from the regulatory agency in Stage 3, actors demonstrated adaptation towards insurance regulations by using data partitioning and data masking to protect customers' personal information. In VP_G, data masking was adopted during the data transmission between Insurer G and Tech M to ensure the security of customers' personal information, as described by a staff from Insurer G,

> *"When it comes to dealing with customers' personal information… all the registration data with personal information such as ID number, name and birth data in the application were masked. And these masked data will be transmitted to Tech M. Therefore, when customers are using this application, Tech M can only see the masked data and make further calculations. Tech M can only use these driving data to improve the application; however, it would not know our customer types." (G2-1)*

Furthermore, as actors had been combining complementary resources to provide telematics insurance services in Stage 3, the tensions between service provision logic and boundary-setting logic emerged. For example, technology firms that had no experience in the insurance sector began realising the need to modify its telematics technology in compliance with insurance regulations in the reviewing procedure in

order to obtain approvals to provide telematics insurance services in the market. Moreover, when Regulator intervened in the service provision by announcing re-examination of telematics insurance in Stage 5, actors stopped issuing and working on modifying telematics insurance policies. As explained by an Associate Vice President from Insurer T:

> *"Recently, all insurance companies can only issue new telematics insurance policies if they have re-designed and re-submitted their telematics insurance based on the new rules announced by Regulator… If insurance companies don't comply with the new rules, they are only allowed to issue renewals of their existing telematics insurance… That's why now we [Insurer T] can only issue renewals since we haven't re-designed our telematics insurance." (T7-2)*

Table 17. Evidence of navigating practices for the tensions between service provision logic and boundary-setting logic

Navigating mechanisms	Navigating practices	Representative data
Applying effectual decision-making techniques	Forming partnerships to overcome regulatory barrier	*"It [organisations outside of the insurance sector] will seek to collaborate with insurance companies to enter the market. It won't try to become an insurance company because it has to be supervised and regulated by Regulator while being an insurance company." (G1-1)*
Boundary drawing	Communicating to figure out the bottom line for all parties	*"Regulator asked us [Insurer T] questions based on the presentations and offered us express consent and suggestions for the design of telematics insurance." (T10-1)* *"It is like a seesaw struggle where both sides are testing the bottom line of each other. Insurance companies tend to request complete [10 out of 10] freedom in the very beginning. However, when they realise that Regulator cannot accept that, they reduce the request to half [5 out of 10] freedom… They [insurance companies] always try to figure out to what extent Regulator could allow innovation." (R1)*
Demonstrating adaptation	Precaution	*"When we were developing the product, we went through the preparation procedures with the Actuarial, Loss Prevention, Risk Management, Compliance, and Auditing departments several times. This is to make sure everything is fine before submitting such new product to the regulator. This way, we know better regarding where to pay more attention in the regulation details." (G2-1)*
	Data partitioning	*"We partitioned off the data. Tech C owns the data in the cloud, but it doesn't have the personal information [of our customers], whereas we own the personal information without having access to the data in the cloud." (T2-1)*
	Complying with regulatory requirements	*"If you [insurance companies] want to innovate, we won't reject it. Nevertheless, you [insurance companies] must also prepare for the following corresponding measurers." (R1)* *"Since customers did not understand or were concerned about [the invasion of privacy] the operation of telematics insurance, we created social media content specifically to introduce the concept of our telematics insurance and address customers' concerns by explaining the way Insurer T processed driving data." (F5-fieldnote)*

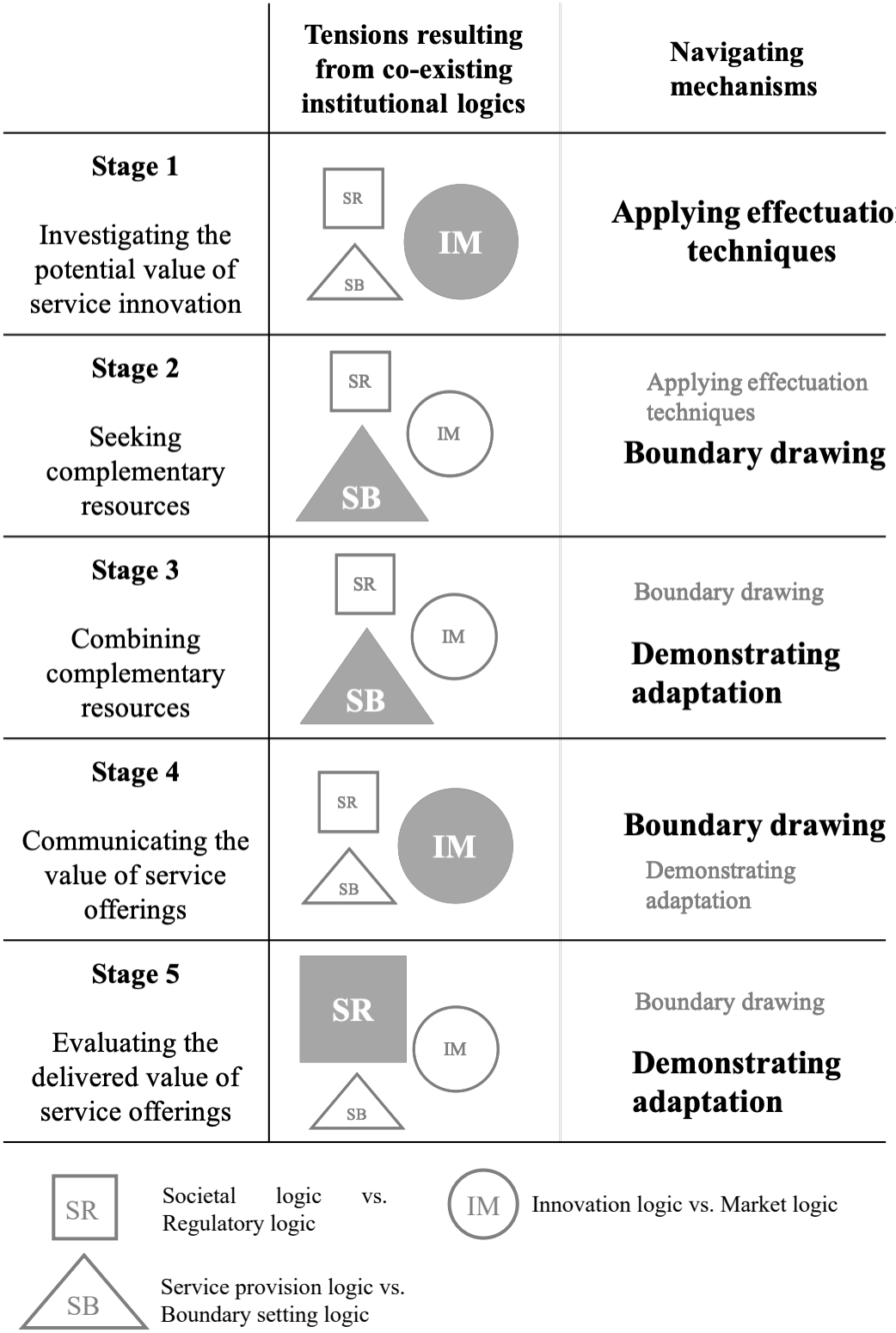
4.5 Conclusion

In summary, the findings revealed that the actors' activities constitute the five stages of the evolution of value platforms in a service ecosystem. Namely, investigating the value of service innovation; seeking complementary resources; combining complementary resources; communicating the value of service offerings; and evaluating the delivered value of service offerings. Moreover, the process-related tensions resulting from co-existing institutional logics were identified across the stages of the evolution of value platforms. Figure 7 presents the overarching tensions and navigating mechanisms in the evolution of value platforms. Three different shapes symbolise the three types of tensions resulting from co-existing institutional logics found in this research, namely the tensions between societal logic and regulatory logic; between innovation logic and market logic; and between service provision logic and boundary-setting logic. In addition, three types of navigating mechanisms were demonstrated regarding how actors dealt with the process-related tensions resulting from co-existing institutional logics. Actors applied effectual decision-making techniques to embrace the co-existing institutional logics. The boundary-drawing mechanism refers to actors interacting with each other to figure out to what extent the co-existing institutional logics could be balanced. Finally, the navigating mechanism of demonstrating adaptation indicates that actors conformed with an institutional logic when they could not manage the tensions triggered by certain external forces.

In Figure 7, the magnified and shaded shapes in the column of tensions resulting from co-existing institutional logics demonstrate the dominant tensions at different stages. In the column of navigating mechanisms, the size and dark colour of the texts illustrate the prominent navigating mechanisms at different stages. The light colour of the texts represents the other navigating mechanisms which were applied by actors at different stages. Tensions between societal logic and regulatory logic indicate that insurance services had to be supervised and managed while the fairness of insurance services was improved by using advanced technology to achieve social progress. They were more pertinent at the stage of evaluating the delivered value of service offerings (Stage 5). Tensions between innovation logic and market logic refer to the development of new types of services through advanced technology while maintaining cost-efficiency and competitiveness. They were found to be influential at the stages of investigating the potential value of service innovation (Stage 1) and communicating the value of service offerings (Stage 4). To navigate such tensions, actors applied effectual decision-making techniques at Stage 1, while actors adopted the boundary-drawing mechanism at Stage 4. Tensions between service provision logic and boundary-setting logic stand for

providing innovative services for customers while following the regulatory boundaries. They were more acute at the stages of seeking complementary resources and combining complementary resources. To navigate such tensions, actors implemented the boundary-drawing mechanism at Stage 2, whilst they demonstrated adaptation at Stage 3.

Figure 7. The overarching tensions and navigating mechanisms in the evolution of value platforms



Note: The larger size of the shapes with shade in the column of tensions resulting from co-existing institutional logics represents the relatively dominant ones at different stages. Texts with darker colour in the column of navigating mechanisms illustrate more prominent mechanisms adopted by actors at different stages.

CHAPTER 5 DISCUSSION OF FINDINGS

5.1 Introduction

The gap in the literature of value platforms is addressed by demonstrating the five stages of value platform evolution in service ecosystems. Additionally, the findings add to the institutional logic literature by presenting the processual aspect of tensions resulting from co-existing institutional logics causing different navigating mechanisms during the service innovation process. While most value co-creation studies focused on the positive aspect, the tensions perspective in value co-creation remains at the practical level. Furthermore, the findings offer more insights into the process of service innovation by investigating value co-creation in a regulated context, namely the insurance sector. The results suggest that regulatory agencies could either facilitate or impede the service innovation process (Steinhauser, 2019).

The findings of the evolution of value platforms demonstrate that changes occur in the context of a service ecosystem resulting in institutional changes. The discussion surrounding service ecosystems traditionally focuses on the outcome-oriented perspective and has recently moved into a processual aspect regarding the emergence of service ecosystems (Vargo, Wieland, and Akaka, 2015; Chandler et al., 2019; Vargo, Akaka, and Wieland, 2020; Polese et al., 2021; Simmonds et al., 2021). Previous research suggested that actors in service ecosystems deal with tensions resulting from competing institutional logics by coordinating with each other while acknowledging the diversity of institutional logics in service ecosystems (Jaakkola, Aarikka-Stenroos, and Ritala, 2019). This study expands the scope of the service ecosystem by exploring multiple actors which were involved in the development process of service innovation in a highly regulated setting (Steinhauser, 2019). Moreover, previous studies have identified that conflicting institutional logics exist among actors and their impacts on how actors manage them in the service ecosystem. Nevertheless, the existing literature tends to emphasise the negative effects of conflicting institutional logics on the outcome (Schulz et al., 2020).

The development of telematics insurance services can be viewed as the evolution of value platforms where changes in context lead to tensions resulting from co-existing institutional logics. For instance, advanced technologies and regulatory authority were contextual changes that drive the development process of service innovation in service ecosystems. The findings of the study support the idea that contextual changes can facilitate and impede service innovation (Edvardsson et al., 2018). It is found that

contextual changes alter the way actors perceive their environment and interact with other actors in a service ecosystem. That is to say, contextual changes affect the structural rules that guide and coordinate actors' perceptions and actions, namely institutional logics (Jaakkola, Aarikka-Stenroos, and Ritala, 2019). Institutional changes triggered the co-existence of multiple institutional logics, and they persist over time in the evolution of value platforms. This study suggests that the evolution of value platforms is driven by tensions resulting from co-existing institutional logics due to contextual changes in a service ecosystem. Tensions resulting from co-existing institutional logics prompt actors to navigate such tensions in order to achieve service innovation. It is found that actors re-configure institutional arrangements which shift the nature of tensions. Such configuration and re-configuration of co-existing institutional logics among actors in a service ecosystem over time reveal the nature of value platform evolution.

The lens of institutional logics is found to offer an explanation of how value platforms evolve in a service ecosystem (Edvardsson et al., 2014). The findings of this study expand the emergence of service ecosystems by adding the aspect of institutionalisation through process-related tensions resulting from co-existing institutional logics. In this study, the perceptions and behaviour of actors were found to be influenced by multiple institutional logics, which is in line with the concept of logic multiplicity (Schulz et al., 2020). In sum, the results suggest that tensions resulting from co-existing institutional logics drive the development of navigating mechanisms which shift the nature of tensions in service innovation processes. It is found that these mechanisms underlie continuous actor interactions and value co-creation.

5.2 The Five Stages of Value Platform Evolution

The findings strengthen the notion of value platforms by explaining the evolution of value platforms through a realist evaluation approach. The CMO configuration approach shows how value platforms evolve during the development process of service innovation. The usage of CMO configurations reveals how actors' behaviour in service ecosystems changes the dynamic and context-specific process of service innovation. Each CMO configuration demonstrates the process of what happened in ecosystems (contexts) that triggered actors' behaviour (mechanisms) which resulted in certain consequences (outcomes) in a certain period of time.

5.2.1 Stage 1: Investigating the value of service innovation

Findings from Stage 1 of value platform evolution indicate that the value and the goals of service innovation were determined and a lack of resources was acknowledged by actors after investigating the potential value of service innovation (Payne et al., 2020). This indicates that actors do not have all relevant resources internally and must implement certain practices to obtain the demanded resources.

The findings suggest that the emergence of advanced technologies and the entry of first mover in the market served as contextual changes which led to decisions being made by actors to develop service innovation since innovation enables actors to compete in the market and differentiate their service offerings from that of their competitors (Lee, Ginn, and Naylor, 2009). The entry of first mover pressured other actors into participating in the development of service innovation since they had to maintain competitiveness. By communicating a clearly defined brand image, actors are able to maintain competitiveness (which refers to brand value creation) by enabling customers to differentiate them from their competitors. Actors considered the entry of first mover as an uncertainty since such a change in the market can disrupt customers' perceptions, which actors intentionally create to increase their competitive advantage and change the way customers perceive them (Merz, He, and Vargo, 2009). Merz, He, and Vargo (2009) identified that brands serve as operant resources for actors to achieve competitive advantage.

Findings from the stage of investigating the potential value of service innovation illustrate that the combination of technology emergence and supports from governmental bodies provide incentives for actors to collaborate with external actors. While actors experienced challenges of investing solely for service innovation, government supports legitimise the integration of complementary resources among actors to generate the required resources through collaboration. Our findings suggest that actors as intermediaries in service ecosystems either facilitate or impede service innovation depends on their behaviour in response to the contextual situation within a certain period of time. Stage 1 of value platform evolution suggests that actors as intermediaries in service ecosystems facilitate service innovation by supporting other actors to establish collaborative relationships (Salehi et al., 2018).

5.2.2 Stage 2: Seeking complementary resources

Findings from the stage of seeking complementary resources suggest that actors are able to overcome the lack of internal resources by enhancing relational legitimacy through the establishment of collaborative relationships with business collaborators to

acquire complementary resources for service innovation (Austin and Seitanidi, 2012; Kwak, Zhang, and Yu, 2019). Actors acknowledge the value of service innovation and seek to combine complementary resources with their potential business collaborators, which share a common goal for service innovation.

Moreover, the findings also indicate that actors overcome resource deficiencies by seeking complementary resources. Although previous studies recognised the value of combining complementary resources among multiple actors to deal with resource deficiencies (Mustak, 2014), there is a lack of clarity regarding the prerequisite for actors to combine complementary resources. Findings of S2M and S2O of value platform evolution enrich this aspect by unfolding the process of actors seeking complementary resources, which eventually leads to decisions made by actors to provide business collaborators with their resources. Actors aim to utilise technology to achieve their goals while seeking complementary resources. Actors demonstrate the potential value of their own resources to attract potential business collaborators which view the combination of resources as a solution for service innovation (Findsrud, 2020).

5.2.3 Stage 3: Combining complementary resources

After the formation of collaborative relationships, actors are committed to the collaborative relationships in order to gain access to complementary resources. They began sharing and combining complementary resources. Hein et al. (2019) highlighted the combination of complementary resources as a type of value co-creating practice which aims to achieve the provision of service offerings. Instead of creating resources internally, the evolution of value platforms highlights the fact that actors self-integrate complementary resources in service ecosystems. Since none of the actors in ecosystems can achieve service innovation alone, they perceive the available resources in ecosystems as being valuable for innovation (Jaakkola and Hakanen, 2013).

Findings from the stage of combining complementary resources suggest the period of resource integration in which actors combine available resources possessed by different actors in ecosystems (Caridà, Edvardsson, and Colurcio, 2019). Through the combination of actors' operand and operant resources, actors are able to transform the potential value identified in Stage 1 into specific and valuable solutions for service innovation.

In addition, findings in this stage of value platform evolution further indicate that the authority of regulatory agencies serves as operant resources and the developed services cannot be launched in the market without approval from regulatory agencies. This

suggests that regulatory approvals serve as a solution to determine the appropriateness of service innovation in which actors combine the complementary resources acquired from other actors in service ecosystems (Cantù, Corsaro, and Snehota, 2012). Actors interact and integrate technology capabilities with knowledge in a regulated sector to develop services that comply with regulatory requirements to obtain regulatory approvals for the launch of new service offerings. Moreover, actors combine their developed services with their business collaborators which are qualified to provide the regulated services. This indicates that the formation of partnerships between actors and licensed business collaborators becomes a solution which enables actors to offer their developed services in regulated sectors.

5.2.4 Stage 4: Communicating the value of service offerings

Findings from the stage of communicating the value of service offerings indicate that various activities were conducted by actors to allow the value of service offerings to be better understood by customers prior to the purchase. This echoes Åkesson et al. (2016) that service test-driving is part of the service innovation process which informs customers about services before purchase.

The findings suggest there are dynamic value propositions in the service innovation process (Payne et al., 2020). In Stage 1 of value platform evolution, a value proposition was considered as a proposal as decisions were made by actors after investigating the value of service innovation. This suggests that a value proposition as a proposal represents actors' expectations of value co-creation. In contrast, in Stage 4 of value platform evolution, a value proposition, served as a promise of value of service innovation, was communicated to customers since this was the point where customers were involved in the process of service innovation. Our findings echo Payne et al. (2020) that actors' expectations of value co-creation (value proposition as a proposal) come first which enables actors to initiate service innovation and interaction for value co-creation. After the value of service innovation was determined by actors, the value proposition transformed into a promise at Stage 4 as actors communicate what they would fulfil through service offerings. Interestingly, findings from this study did not suggest value documentation in the process of service innovation, which contradicts Payne et al. (2020). Actors did not use value documentation to communicate the value since they considered such technology to be too new and they would like to reduce the stress of salespeople.

Since innovative service offerings are new in the market, actors provide training and communication to facilitate the learning process. Actors educate their distribution

channels through training programmes to understand the value of promoting innovative service offerings to their customers. Moreover, by communicating the value of innovative service offerings to customers, customers understand the benefits of those offerings to them. This would motivate customers to be involved in using such service offerings, which further enables the value-in-use in value co-creation (Bonamigo, Frech, and Lopes, 2021).

5.2.5 Stage 5: Evaluating the delivered value of service offerings

The findings from the stage of evaluating the delivered value of service offerings strengthen the understanding of how regulatory forces affect service innovation through a processual aspect by suggesting that regulatory forces not only facilitate but impede service innovation. Contradictory results were found in previous studies regarding the effects of regulatory forces. While some studies suggested that regulatory forces discourage service innovation (Lee, Ginn, and Naylor, 2009), other studies advocated that they facilitate service innovation (Findsrud, 2020). Although Lee, Ginn, and Naylor's (2009) findings suggested that regulatory forces discouraged service innovation, they also pointed out that further processual studies are required to investigate how regulatory forces play out differently in the process of service innovation. Instead of suggesting the statement that new regulations force service innovation (Findsrud, 2020), the findings from Stage 5 of value platform evolution demonstrate the establishment of new regulations as an institutional change which inhibits service innovation. Therefore, this study highlights the importance of dynamic contextual situations in the process of service innovation, which influences institutional changes.

Prior research found that actors tend to limit services by conforming with regulatory requirements as new regulations are established (Lee, Ginn, and Naylor, 2009). Lee, Ginn, and Naylor (2009) argued that regulatory forces constrain and discourage service innovation. In other words, new regulations reduce service differentiation, which discourages actors from investing in service innovation. At the stage of evaluating the delivered value of service offerings (S5), the establishment of new regulations resulted in sales suspended by actors since requirements from new regulations reduced differentiation between telematics services. Therefore, service innovation was not perceived as valuable for actors due to the establishment of new regulations. At this stage, new regulations were perceived as an inhibitor in the service innovation process. This indicates that once new regulations were placed in the sector, sales were suspended since actors had to modify the design of service innovation based on the new regulations.

5.3 Tensions Resulting from Co-existing Institutional Logics

The findings offer more insights to the value co-creation literature by exploring process-related tensions in service ecosystems through an institutional lens (Ranjan and Read, 2021). Three types of tensions resulting from co-existing institutional logics were found in the evolution of value platforms. Previous studies suggested that institutions influence service innovation. For instance, Lee, Ginn, and Naylor (2009) argued that regulations as formal institutional pressures hinder service innovation, while competition in the market prompts service innovation so that actors can differentiate themselves from other competitors. Hence, our research argues that the processual aspect needs to be taken into account while investigating value co-creation in service innovation. The processual aspect had been neglected in previous studies, which resulted in diverse results.

Since actors' behaviour varies due to their own perceived value, motives, and goals towards service innovation, such mismatching norms and rules generate conflicts and tensions as actors co-create value in service ecosystems (Lievens and Blažević, 2021). Hence, the findings of this research suggest that tensions result from the co-existence of institutional logics in the service innovation process which influence value co-creation in service ecosystems.

5.3.1 Tensions between societal logic and regulatory logic

Both regulatory logic and boundary-setting logic belong to the regulative pillar of institutions. Regulatory processes which involve activities around rule establishment, examination of actors' conformity to rules, and control sanctions which aim to create an impact on actors' future behaviour (Scott, 2013). Regulatory logic centres on regulatory actors' interests of establishing rules and laws and monitoring actors' conformity to regulations to advance their interests in the sector. Nevertheless, the findings indicate that regulatory logic contradicts societal logic in the sense that service innovation creates uncertainties in the regulatory processes despite its value of driving social progress (Agarwal et al., 2015). The findings suggest that actors encounter tensions between their goals of improving social progress or providing fairer services and their behaviour being limited by rules set by public actors. Actors from sectors that have not been managed or controlled by public actors before face the challenge of having insufficient understanding of regulations. This prolongs the process of combining complementary resources.

Additionally, the tensions between societal logic and regulatory logic indicate that there are inconsistent responsibilities between government agencies and regulatory agencies (Cornford, 2019). The goals of improving social progress and the aim of maintaining market stability challenge the development of service innovation in the early stage. Such tensions are perceived by actors as uncertainties and advanced technology may provide fairer services while they could create discomfort in the area of supervision and management. Moreover, actors driven by the goal of maintaining market stability experience tensions resulting from service innovation. These actors are reluctant to adapt to service innovation despite it offering fairer services to their customers. This is because they perceive service innovation driven by technological changes as potential risks and uncertainties for disrupting market stability (Ouyang et al., 2020).

5.3.2 Tensions between innovation logic and market logic

There are innovation paradoxes between exploratory innovation and exploitative innovation (Tushman and O'Reilly, 1996). The authors introduced the concept of ambidexterity capability as an actor's dynamic capabilities to use its existing resources to improve its value as new technologies emerge in the sector. Technological changes as institutional changes in service ecosystems trigger tensions resulting from competition for limited resources. When the emergence of new technologies is perceived by actors with large market share to threaten their existing market share, they encountered tensions resulting from investing in innovation for unpredictable returns while maintaining market share without being eliminated by other competitors (Ouyang et al., 2020). In contrast, the findings suggest that actors with relatively small market share perceive the emergence of new technologies as an opportunity to increase their market share. Nevertheless, they have limited resources such as human resources and technology capabilities to achieve service innovations while having to invest for unpredictable returns (Bonamigo, Frech, and Lopes, 2021).

5.3.3 Tensions between service provision logic and boundary-setting logic

When a service ecosystem involves both public and private actors, interests from both sides have to be addressed. For actors that seek to provide new service offerings through service innovation in a highly regulated social context, their goals centre on conforming to rules and laws to avoid new service offerings being sanctioned (Scott, 2013). This suggests actors' activities influenced by regulative legitimacy. The design and concept of new service offerings must comply with regulations to secure approvals for sales. This indicates that regulations act as regulatory boundaries which determine the eligibility of service offerings being provided in the market. However, actors often experience tensions stemming from regulatory uncertainties while developing service

innovation due to insufficient existing regulations to guide and accommodate service innovation (Steinhauser, 2019). This prompts actors to seek regulation clarity that becomes an operant resource for actors. The findings indicate that when service innovation in a regulated sector involves data transmission between actors, the issue of information security is elevated to consumer rights protection in regulative institution rather than knowledge protection in normative institution.

5.4 Mechanisms of Navigating Tensions Resulting from Co-existing Institutional Logics

5.4.1 Applying effectual decision-making techniques

The findings indicate that when service innovation emerges in a highly uncertain environment, actors apply effectual decision-making techniques without trying to predict the future of service innovation. Investigating the value of service innovation enables actors to acknowledge a shortage of internal resources for service innovation (Galkina, Atkova, and Yang, 2021) and identify the complementary resources they need for service innovation (Danatzis, Karpen, and Kleinaltenkamp, 2021). Hence, the findings suggest that the navigating mechanism of applying effectual decision-making techniques facilitates actors to utilise their existing resources in hands to achieve innovation. For instance, actors in market logic affected by cost-efficiency set staged goals for developing new service offerings in order to invest with affordable losses (Galkina, Atkova, and Yang, 2021). Moreover, actors gain access to external resources that complement their existing resources for service innovation through collaborative partnerships with external actors (Ko et al., 2021). Therefore, actors combine their existing resources with complementary resources possessed by external actors. This allows actors to create new resources with insufficient internal resources for service innovation. For example, actors use formal contracts and agreements to establish collaborative partnerships for service innovation (Reypens, Lievens, and Blazevic, 2019).

5.4.2 Boundary drawing mechanism

The findings suggest that boundary-drawing mechanisms are adopted by actors to resolve tensions resulting from co-existing institutional logics during the service innovation process. When multiple actors possess divergent and conflicting goals in service ecosystems due to information asymmetry, actors draw boundaries around their resources and capabilities together with other actors to reconcile their goals and process. For example, actors in market logic influenced by competitions would seek to protect resources needed for innovation. Therefore, actors prevent potential opportunistic

behaviour through boundary-drawing mechanisms (e.g. patent protection, relationship building, selective revealing) after decisions of external collaboration have been made (Mustak, 2014; Bonamigo, Frech, and Lopes, 2021). This allows actors to overcome tensions resulting from divergent and conflicting goals by figuring out a balanced state among conflicting goals possessed by multiple actors in service ecosystems (Danatzis, Karpen, and Kleinaltenkamp, 2021). Actors protect their unique operant resources by using formal and informal practices which enable resource integration among actors while limiting their business collaborators' behaviour to a certain extent. In contrast, actors protect their unique operand resource by applying formal instruments to prevent actors from imitation (Bonamigo, Frech, and Lopes, 2021).

Moreover, actors in boundary-setting logic affected by insufficient regulatory guidance for designing service innovation would aim to clarify regulatory requirements from regulatory agencies. Therefore, actors implement boundary-drawing mechanisms through interactive involvement such as jointly figuring out the bottom line for all parties to balance between providing services in the market (Kaartemo, Nenonen, and Windahl, 2020; Danatzis, Karpen, and Kleinaltenkamp, 2021). Furthermore, public actors in regulatory logic threatened by regulatory authority and disruption of market stability would aim to manage and control actors' activities. Hence, public actors adopted boundary-drawing mechanisms such as establishing rules and regulations to create new regulatory requirements for other actors to comply with (Kaartemo, Nenonen, and Windahl, 2020).

5.4.3 Demonstrating adaptation

Actors demonstrate adaptation to regulative institutions by showing their ability to comply with existing regulatory requirements, change their strategies of service provision, and align the design of service innovation with new regulatory requirements (Danatzis, Karpen, and Kleinaltenkamp, 2021). Furthermore, when actors receive feedback regarding service offerings from customers, they improve service offerings based on the received feedback. This enables actors to demonstrate that they can improve service offerings by learning from customers' feedback. Additionally, market feedback is perceived by actors as a contextual change in service ecosystems which results in actors applying the navigating mechanism of demonstrating adaptation. Market feedback offers opportunities for actors to develop solutions that meet customers' perceived needs (Fisher, 2012). Hence, actors show their ability to improve and refine service offerings based on the market feedback received from customers. Moreover, actors terminate collaborative relationships with business collaborators by demonstrating to their business collaborators that the value of service offerings is not

as expected. Although Danatzis, Karpen, and Kleinaltenkamp (2021) highlighted the importance of sustaining relationships in service ecosystems, the findings of this study suggest that actors terminate collaborative relationships when collaborative relationships do not enable value co-creation among actors.

5.5 Institutional Logics and Tensions throughout the Evolution of Value Platforms

The findings indicate that the tensions resulting from societal logic and regulatory logic persist over the evolution of value platform. The perception of regulatory agencies and regulations evolve over time during the process of service innovation. They are relatively insignificant in the early stages of value platform evolution since the institutional context leans towards using advanced technologies to enhance fairness in the society and improve social progress. Although actors in regulatory logic are concerned that service innovation leads to uncertainties of market stability, they cannot forecast how service innovation would disrupt the market. In such an institutional context, actors apply effectual decision-making techniques to manage non-predictive service innovation within their existing resources and affordable losses.

In contrast, as actors are at the stage of evaluating the delivered value of service offerings, the tensions between societal logic and regulatory logic become dominant. When there is clear evidence that service innovation is causing a disruption to market stability over enhancing fairness in the society, such contextual change leads to a shift of navigating mechanisms towards both boundary drawing and demonstrating adaptation. Regulatory actors establish new rules and regulations for service innovation which interrupt the provision of service offerings to maintain market stability. This enables regulatory actors to set clear boundaries around their resources. Moreover, other actors implement the navigating mechanism of demonstrating adaptation to adjust their strategies of service provision and align the design of service innovation with new regulatory boundaries.

The findings further suggest that the tensions between innovation logic and market logic and the corresponding navigating mechanisms evolve in the service innovation process. When actors are investigating the potential value of service innovation, the tensions between innovation logic and market logic become prominent. By investigating the value of service innovation, actors realise that they do not have all the required resources internally to develop new types of services or apply innovative technologies into existing services. At this stage, a high level of uncertainty exists since actors are unable

to predict how service innovation would influence the market and whether service innovation is worth investing (Kaartemo, Kowalkowski, and Edvardsson, 2018). The findings indicate that actors focus on experimentation in the early stage of value platform evolution by applying effectual decision-making techniques. In the early stage, experimentations occur since how value is co-created and who can benefit from service innovation remain unclear (Read and Sarasvathy, 2012). Such an approach facilitates actors to develop novel methods of resource integration in value co-creation. Actors maintain affordable losses in investment by collaborating with external actors which already possess complementary resources rather than developing all resources internally. In other words, actors' behaviour is driven by the motives to integrate existing resources possessed by diverse actors so that actors minimise the risks and uncertainties of service innovation while maintaining affordable losses in service innovation investment.

Interestingly, the tensions between innovation logic and market logic become dominant again as value platforms evolve into the stage of communicating the value of service offerings. In this stage, the context shifts towards the need to introduce new services to the market after they have been developed through resource integration among actors. However, actors experience tensions between introducing new services to the market and market competition. When the first innovative service offering is launched in the market, this results in other actors seeking to acquire the specific resources developed by first movers. This then creates tensions regarding obtaining unique resources for innovation and increasing market share by attracting customers with new services. Therefore, actors shift towards applying boundary-drawing mechanisms to protect their unique resources when communicating the value of service offerings.

Furthermore, the analyses identify that the tensions between service provision logic and boundary-setting logic are prominent at the stage of seeking complementary resources. At this stage, actors are still drafting ideas and seeking complementary resources for developing new services, and new services have not been developed. Regulatory requirements are resources for value co-creation. When actors address regulatory requirements in the design of the new services, it legitimises their activities of service innovation. As the idea of service innovation is still new for actors in service ecosystems, the regulatory requirements for new services have not been established at this stage since the existing regulatory requirements are developed to accommodate existing services. Thus, both public and private actors implement boundary-drawing mechanisms in this stage by jointly negotiating unwritten regulatory requirements for new services through the discussion between public and private actors. Public and

private actors negotiate and clarify their resource boundaries around ideas of new services. This enables actors to address unwritten regulatory requirements in the design of service provision. As a result, implementing such mechanisms at the stage of seeking complementary resources reduces regulative uncertainties of service innovation in regulated sectors by finding a balance between the two institutional logics.

Nevertheless, when actors are combining complementary resources, the tensions between service provision logic and boundary-setting logic become dominant again. In this stage, the legitimacy of providing such new services to customers is determined by regulatory agencies rather than actors themselves. Therefore, actors shift their navigating mechanisms towards demonstrating adaptation since meeting regulatory requirements becomes a primary goal for actors. Actors gain legitimacy by aligning activities around new services with regulatory requirements. This demonstrates that the provision of services is adapted to regulative institutions.

According to the evolution of navigating mechanisms over time, it is noteworthy that actors apply effectual decision-making techniques in the early stages of value platform evolution. In the early stages, actors act as entrepreneurs by focusing on experiments with service innovation to identify opportunities without predicting the future. This enables actors to stay open to service innovation and create new markets by providing new service offerings through service innovation. When the new markets created through service innovation gradually become stable, actors switch to demonstrating adaptation in the later stages of value platform evolution. After new service offerings are provided in the market, actors begin receiving feedback about new service offerings. This facilitates actors to exploit the received information by improving the design of service offerings based on customers' demands, and they start predicting the future of new service offerings by evaluating the effect of service innovation.

CHAPTER 6 CONCLUSIONS

6.1 Research Summary

The overarching objective of this thesis is to investigate the mechanisms of actor interaction in platform-based service innovation. This research seeks to unravel the three research objectives: 1) How do value platforms embedded in service ecosystems evolve? 2) What tensions arise throughout the evolution due to the multiple institutional logics of the actors within the ecosystem? 3) How do actors navigate multiple institutional logics as value platforms evolve?

To answer the first research question, the temporal nature of value platform evolution within service ecosystems to achieve service innovation was broken down into five stages through the temporal bracketing approach and the concept of context-mechanism-outcome configurations from the single case of the telematics service ecosystem. This research argues that the evolution of value platforms can be theorised through the lens of institutional logics. The contextual changes in service ecosystems result in co-existing institutional logics experienced by actors as tensions. Hence, value platforms evolve as actors apply mechanisms to navigate co-existing institutional logics in the process of service innovation. The evolution of value platforms demonstrates a dynamic aspect regarding how actors' behaviour is shaped by events that occur in service ecosystems and how their behaviour in response to such events further creates an impact on other actors' perceptions and behaviour (Lievens and Blažević, 2021).

To answer the second research question, the overarching tensions of co-existing institutional logics in the service innovation process were unravelled. Moreover, the findings show the evolutionary nature of three types of mechanisms applied by actors to navigate tensions resulting from co-existing institutional logics for actors to answer the third research question. This research deepens the notion that a service ecosystem offers an institutional context by suggesting the co-existence of multiple institutional logics that shape resource-related activities during the service innovation process (Lievens and Blažević, 2021). When actors experience tensions resulting from co-existing institutional logics, actors develop mechanisms to navigate in service ecosystems during the service innovation process. This resulted in actors shifting their navigating mechanism by closely monitoring and promptly adjusting strategies along the development process as value platforms evolve over time. The findings suggest that effectual decision-making techniques were applied in early stages of value platform evolution since uncertainties were at a high level. Nevertheless, as the level of

uncertainties reduced over time, actors shifted their navigating mechanisms towards the boundary-drawing mechanism for negotiation among actors and demonstrating adaptation to show their ability to adapt to institutional and contextual changes.

6.2 Research Contributions and Implications

6.2.1 Theoretical contributions

The main theoretical contribution of the research is to the service ecosystem literature through the incorporation of a dynamic and processual perspective to value platforms. The findings indicate that tensions and navigating mechanisms evolve over time and arise from the dynamic nature of value platforms during the service innovation process. The results contribute to the body of research on platforms in the following ways. They: 1) provide a processual perspective to the articulation and explanation of tensions resulting from co-existing institutional logics inherent in value platforms for service innovation; 2) identify and unravel the nature and evolution of navigating mechanisms and the way they impact on such tensions; 3) identify the influence of regulatory actors as impediments and facilitators in service ecosystems over time.

This research extends the service innovation literature by applying the CMO configurations of value platforms evolution for the first time to unravel the dynamic actor interactions and the unstructured service innovation processes. The empirical findings demonstrate the dynamic actors' resource-related activities which evolved as contextual changes occurred at different stages over time. This suggests that the service innovation processes were ad-hoc in nature and not formalised by actors in advance. Moreover, the current study contributes to a holistic process model of service innovation from a value co-creation perspective at the ecosystem level through the evolution of value platforms since research in the field of service innovation has mostly focused on particular aspects of practices such as technological aspects or certain phases.

Another theoretical contribution of the research is to the literature of institutional logics concerning the evolution of value platforms embedded in service ecosystems. Although the extant institutional logics literature highlights tensions resulting from co-existing institutional logics, this research is the first study which explores the dynamic nature of tensions resulting from co-existing institutional logics overtime. The current study contributes to the processual aspect of the institutional logics in the service innovation literature by demonstrating the dynamic tensions resulting from multiple institutional logics in service ecosystems and navigating mechanisms through value platforms evolution.

Furthermore, while the service innovation literature has focused on the processual aspect regarding the ways in which innovations emerge and are re-produced over time, few studies pay attention to the combination between the ecosystems and process perspectives simultaneously. This study explains the dynamic nature between tensions resulting from co-existing institutional logics and navigating mechanisms over time. This contributes to the literature by combining both processual and ecosystems aspects simultaneously to show how tensions result from institutional logics evolve over time and how value is co-created in service ecosystems during the service innovation process. As actors were guided by different institutional logics at different periods of time, tensions resulting from institutional logics varied as contextual changes occur in different periods of time in service ecosystems. This contributes to a more in-depth understanding of institutionalisation in service ecosystems by demonstrating the processual aspect of tensions resulting from co-existing institutional logics. Such tensions have facilitated the development of different navigating mechanisms by diverse actors in response to contextual changes which demonstrate the ad-hoc nature of the service innovation process.

In addition, the understanding of the service innovation process in service ecosystems is not well understood in the literature of institutional theory. Since multiple institutions exist in a service ecosystem, it is suggested that actors' behaviour is influenced by various institutional logics in a service ecosystem. By adhering to expectations from various institutional logics, actors are able to cultivate resources and gain legitimacy. Firstly, this research presented the five stages of value platform evolution to address the criticism of the scarcity of studies on the whole process of service innovation in service ecosystems. As noted previously, there has been an ongoing debate regarding the nature of the service innovation process. This research contributes to a more detailed understanding of ad-hoc and unstructured service innovation processes by adopting the context–mechanism–outcome configuration approach to show that contextual conditions at different stages of value platforms led to changes in actors' behaviour and resource-related activities over time. This research takes the service innovation literature to a more holistic perspective of value co-creation in the service innovation processes by demonstrating the evolution of tensions resulting from multiple institutional logics in configurations of service ecosystems.

Moreover, by demonstrating a processual perspective to articulate tensions resulting from co-existing institutional logics and navigating mechanisms in value platform evolution, this study addressed the demand for a processual study of the

institutionalisation process of service innovation in service ecosystems. This research empirically enriches a processual understanding of value co-creation among multiple actors in service ecosystems for service innovation by proposing the process of service innovation from a dynamic and value-centric perspective through value platforms evolution. In the absence of a processual aspect of tensions, there is a lack of explanation for the diverse and contradicting outcomes resulting from tensions in the literature. Recent studies have called for the exploration of the tensions aspect of value co-creation in service ecosystems literature since previous studies have primarily focused on the positive aspects of value co-creation. Although scholars acknowledged that tensions have a negative impact on service innovation, value co-creation, and service ecosystems, the understanding of how actors navigate tensions remains at a conceptual and practical level (DiVito, van Wijk, and Wakkee, 2020; Gupta, Panagiotopoulos, and Bowen, 2020). Conceptually, scholars have suggested that tensions exist in service ecosystems formed by multiple actors which possess different goals or expectations. Empirically, researchers have identified various types of tensions and coping practices for tensions (Tóth et al., 2018; Kohtamäki, Einola, and Rabetino, 2020). Yet, the theoretical level of how tensions influence the value co-creation process among multiple actors in service ecosystems remains unclear regarding the types of tensions develop between actors during service innovation processes and how actors respond to tensions (Jamie et al., 2016).

The current research contributes to a theoretical understanding of the tensions literature by demonstrating a processual nature of how the evolution of tensions influence that of navigating mechanisms over time. The results of the findings suggest that it is not tensions per se that impede or facilitate value co-creation in service innovation, it is how the evolution of navigating mechanisms along with these dynamic tensions which influence impede or facilitate value co-creation in service innovation. The findings indicate that when tensions result from blurry and unstable institutional boundaries in the early stage of innovation process, actors apply effectual decision-making techniques to navigate tensions in a high level of uncertainty environment. When tensions emerge in situations where service ecosystems become more stable and institutional boundaries become clearer, the navigating mechanisms of boundary drawing and demonstrating adaptation are adopted. Boundary-drawing mechanisms are implemented to negotiate the institutional and resource boundaries among multiple actors to limit their behaviour and activities in the process of institutionalisation. Additionally, when institutional changes put actors in non-negotiable situations, they shift towards demonstrating adaptation to show their ability to adapt to institutional changes.

Lastly, this research identifies the influence of regulatory actors as impediments and facilitators in service ecosystems over time. The extant literature has shown mixed and conflicting results regarding the influence of regulatory actors in innovation (Sibindi and Zingwevu, 2015). This research enriches the literature by presenting a processual aspect to reveal changes in regulatory actors' role as value platforms embedded in service ecosystem evolve over time. Depending on the institutional contexts in service ecosystems, regulatory actors adopt different navigating mechanisms which make them as both impediments and facilitators in service ecosystems during the process of service innovation. Regulatory actors serve as facilitators when they utilise their resources in hand to support actors to innovate new service offerings or when they allow actors to negotiate regulatory requirements for service innovation. By contrast, regulatory actors become impediments when they intervene to manage market disruptions and control actors' inappropriate behaviour through the establishment of new regulations and rules.

6.2.2 Managerial implications

For practitioners involved in service innovation in regulated sectors, the findings of the study provide implications for the process of service innovation. Firstly, companies and managers could consider utilising the participation of their distribution channels and frontline employees in the early stage of service innovation so that the real practical situations and customer demands could be better known and addressed in the process of service innovation. This would allow value to be created more effectively. Secondly, this study highlights the fact that changes in service ecosystems and actors' behaviour mutually shape the service innovation process, suggesting that practitioners in both private and public actors should evaluate how the decisions they made would affect the service ecosystem as a whole before taking actions. In addition, this study has identified several practices of navigating tensions being adopted by different actors under different contextual situations during the service innovation process. Thus, practitioners could refer to these navigating practices to further brainstorm their approaches in response to tensions that occurred in service ecosystems over time.

Thirdly, instead of aiming for each actor's individual goal, managers are advised to consider the institutional logics which influence regulatory agencies and policymakers' behaviour while investigating the potential value of service innovation in the early stage of the development process. This would allow managers to enhance the legitimacy of service innovation while ensuring new service offerings are aligned with policymakers' expectations and goals to a certain extent (Vargo, Akaka, and Wieland, 2020). Furthermore, our findings indicate that viewing service innovation as a formalised process is an error on behalf of any organisations that seek to achieve service innovation.

Rather, practitioners have to nurture a mindset where service innovation evolves over time and unexpected events may occur, and that no actor has full control over other actors' behaviour. Hence, key people from diverse actors, who are involved in highly uncertain conditions for innovation, are advised to embrace the unstructured and informal nature of innovation processes. Managers should constantly examine what activities and events are occurring in the service ecosystem as a whole during the service innovation process in order to stay informed and develop corresponding navigating strategies. This will enable both public and private actors to react and make adjustments to their behaviour more promptly through a relatively spontaneous approach. Finally, rather than placing the focus on achieving innovation outputs, managers should pay more attention to the value aspect in service ecosystems by regularly reflecting on their value propositions, and take into consideration what and where potential tensions may emerge during the service innovation process from an ecosystem point of view. It is suggested that managers should consider both value platforms and service ecosystems aspects together during the service innovation process to co-create value. Organisations in the case failed to enhance service innovation partially because actors tended to focus on their own goals, yet they failed to maintain long-term value co-creation relationships with other actors in ecosystems over time.

6.3 Limitations and Future Research Directions

The current research has limitations that offer opportunities for future research to explore. This study was conducted in only one single context, namely telematics insurance in Taiwan regarding the development process of service innovation. This study calls for future studies to explore service innovation from a value-centric and ecosystem-oriented perspective so that such perspective provides a more generalised conceptual framework which could lead to the convergence of NPD and NSD literature streams. While previous studies around NPD and NSD are derived from good-dominant logic, more future studies are encouraged to combine the value concept and institutional logics from service ecosystems as an integrated framework to move the service innovation literature from the technological aspect towards the processual aspect of institutional logics evolving in ecosystems.

Although it is acknowledged that findings from a single case cannot be statistically generalised, it is believed that this research is generally applicable for exploring innovations in other regulated settings. Actors encounter the co-existence of multiple institutional logics in service ecosystems, especially when they are conducting service innovation in regulated sectors, such as telecommunications, healthcare, construction,

and financial services. This would facilitate a better understanding regarding multiple actors having to innovate in sectors where actors' actions and behaviours are affected by regulations and societal obligations. Hence, it is encouraged that future studies draw on multiple cases of service ecosystems in different regulated sectors to test the findings' generalisability regarding the processual aspect of tensions resulting from co-existing institutional logics in ecosystems over time. This would enable scholars to generalise a processual aspect of how co-existing institutional logics and navigating mechanisms in ecosystems influence service innovation in different regulated settings (Cassell and Symon, 2004). Furthermore, it may also deepen our understanding of different institutional logics and how their co-existence may lead to tensions within ecosystems. Moreover, this would offer more insights regarding the impact of public actors, such as government bodies and regulatory agencies, during service innovation processes in service ecosystems.

Additionally, it would be interesting to explore not only the process of successful service innovation cases but also that of failed ones, to analyse how tensions that evolve and are navigated in service ecosystems over time may influence the result of service innovation. This may provide practitioners with a more in-depth understanding of what leads to tensions caused by multiple co-existing institutional logics and identify navigating mechanisms to build legitimacy in service ecosystems. Moreover, it is encouraged that future studies conduct more longitudinal studies to further explore the institutionalisation process among multiple actors in service ecosystems by investigating the parallel existence of value co-creation and tensions in the service innovation process over time.

Although recent studies have highlighted the potential of bridging institutional logics and institutional work together in a theoretical framework (Berthod, Helfen, and Sydow, 2019), the understanding of the inter-relationship between institutional logics and institutional work is still in its infancy. Previous studies either adopted an institutional logic or institutional work perspective respectively. This study suggests that future studies could develop a theoretical framework by bridging institutional logics and institutional work to investigate institutionalisation processes from an ecosystem level, which considers both spatial and temporal elements. This would offer more insights for understanding the whole innovation process as the process of institutionalisation.

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Appendix 1. Overview of Phase 1 interview guide

Overview of Interview Questions

General Questions

- Please introduce yourself in terms of your background, work experience, and position in the organisation/institution.
- Please introduce your company.
- Please describe the telematics insurance project you are/have been involved in.
- Which firms participated in the project?

Drawing Section (colour pens and paper will be provided)

- (For network picture) Please use the provided pens and paper to draw a picture of the entities that are around you/your company and their relations in the development process of telematics insurance.
- (For critical incidents technique) Please draw the sequence of the telematics insurance development by pointing out when the significant incidents occurred.

Interview Questions

- Please try to explain what you have drawn in the network picture section and critical incident section.
- Please describe the processes/incidents that were critical for you by starting from the beginning of the development process of telematics insurance.
- Please name the entities that were involved in the development process of telematics insurance.
- Can you tell me about the relationships that exist among these entities during the process of developing telematics insurance?
- Please explain your firm's position within the telematics insurance development network.
- Where do you see the major/most interesting changes that happened in your firms during the development process of telematics insurance?
- Could you elaborate on the most recent incidents or the incidents you are more familiar with in the development process of telematics insurance? How did you react to it?
- What is your view on any potential obstacles of balancing stability and flexibility experiences while its objectives changed?

Appendix 2. Activities audit of Stage 1 in value platform evolution

Activities audit:

Sources of evidence:

1. Semi-structured interview: first-round of interviews; second-round of interviews
2. Critical incident
3. Network picture
4. Archives:
   - **Insurance regulations (IR)**
     1. Regulations for Establishment and Administration of Insurance Enterprises
     2. Regulations Governing Pre-sale Procedures for Insurance Products
     3. Article 137 of Insurance Act: Eligibility Conditions for Establishment of Domestic Insurance Enterprises and Foreign Insurance Enterprises
     4. Acts in relation to the responsibility of FSC (FSC Act)
     5. Article 16 of Regulations Governing Pre-sale Procedures for Insurance Products
   - **Online news articles (ONA)**
     1. An online article which interviewed the CEO of Tech C (OA)
   - **Magazine articles (MA)**
     1. An interview with the chairman of FSC in a magazine article (MA-FSC)
   - **Annual reports of Insurer T, Insurer G, and Tech M**
   - **Webpages of official websites:**
     1. Webpages of FSC (WP-FSC)
     2. Webpages of Regulator (WP-Regulator)
     3. Webpages of Insurer G (WP-Insurer G)
     4. An online survey conducted by an automotive website (OR-survey)
   - **Official online reports (OR)**
     1. A Report published by U.S. Commercial Service about fintech opportunities in Taiwan (2017)
     2. Online reports which summarised the regulatory framework in Taiwan
     3. Official documents published by FSC (OD-FSC)

Context (S1C)

1. The emergence of advanced technologies in the sector

a. Change of government policies from FSC to support financial technology

– *"Starting in 2014, FSC began to play a more active role in creating an atmosphere that would foster the growth of financial technology by launching the 'Digital Financial Environment 3.0' project. ... Insurance companies were allowed to provide low-risk electronic services online such as acquiring insurance…" (OR1)*

– *"FSC released the FinTech Development Promotion Program in October 2016, a plan that includes 10 measures to facilitate industry development. The program envisioned the improvement of financial industries and the provision of innovative financial services to consumers. One of the focuses was stated as 'Encouraging insurance companies to develop innovative insurance product for big data… such as developing diversified telematics insurance applications.'" (OD-FSC)*

– *"FSC established the FinTech Office in 2015 to plan and promote FinTech development and to enhance operational efficiency and market competitiveness." (WP-FSC)*

– *"The value of telematics insurance for Regulator was that it could demonstrate the development and launch of telematics insurance in its performance evaluation of promoting financial technology." (T2-2)*

– *"The government and FSC had set staged-goals of promoting FinTech 1.0, 2.0, 3.0" (T6-1)*
– *"FSC sent official documents to all financial entities to emphasise the importance of developing innovative financial products in response to financial digitisation." (OD-FSC)*
– *"Outlays by the Financial Supervisory Fund shall be used for the following purposes... 2. Promotion of research and development of financial systems and new types of financial products" (FSC Act)*

b. Government agencies initiated the development of public versions of telematic insurance

– *"IRI implemented a plan to develop telematics insurance services [on behalf of Regulator]. In the begin of 2016, IRI invited four insurance companies such as Insurer G and [other three insurance companies]. Each insurance company was expected to appeal to 4,000 users to participate in the development of the public version of telematics insurance services. The first phase of the plan was to collect driving data from 16,000 users and then the collected driving data will be analysed to establish the pricing model of telematics insurance." (MA)*
– *"At the end of 2015, IRI presented a platform for storing driving data with four insurance companies including Insurer G and [three other insurance companies] in order to develop the first public project of telematics insurance. The plan was for insurance companies to distribute telematics devices to consumers. Afterwards, it (telematics devices) will regularly gather and upload driving data to the platform for the adjustment of the pricing model." (Online news article: 19. Jun. 2016)*
– *"NIA organised a meeting with all non-life insurance companies to discuss the design of another public version of telematics insurance policy. NIA would like to build a platform to store driving data collected by all insurance companies. The usage of telematics application to collect driving data was expected to reduce the cost of investment for insurance companies." (MA, G3)*
– *The public project of telematics insurance initiated by Regulator triggered Insurer G's awareness that Regulator had started paying attention to telematics insurance. (G2-1).*

c. Change of Regulator's attitude towards innovation

– *"When the public versions of telematics insurance were piloting… some of our senior executives already realised that even Regulator had started paying attention to the concept of telematics insurance…" (G2-1)*
– *"At that time, NIA had organised several meetings with all insurance companies regarding the development of a public version of telematics insurance… It was Regulator which requested NIA [to initiate the development of a public version of telematics insurance]." (G3)*
– *"It is hoped that… when FSC begins loosening regulations, there would be more insurance companies that are willing to participate in the development of innovative insurance products." (OD-white paper)*
– *"FSC has been promoting financial technology by encouraging financial enterprises to develop financial technology. It has sent official documents to NIA to inform all the members of NIA [non-life insurance companies] to pay more attention to the area of financial technology due to digitalisation in the financial industries." (Online magazine article: 13. May. 2016)*

d. The application of Internet of Things

– *"IoT is the interconnection via the internet of devices embedded with communications software and hardware, processors, sensors and network connectivity, enabling them to send and receive data without human-to-human or human-to-device interaction. For financial institutions that means new opportunities for the collection and protection of data. Fintech IoT applications that could add to consumer convenience include ATM transactions based on smartphones or smartwatches rather than debit cards, or car insurance rates geared to policyholders' driving behaviour." (Online news article: 3. Nov. 2017)*

– *"For financial institutions, that [Internet of Things] means new opportunities for the collection and protection of data… it could add to consumer convenience include… or car insurance rates geared to policyholders' driving behaviour." (Online news article: 3. Nov. 2017)*
– *The emergence of Internet of Things resulted in the opportunity for insurance companies to improve their services by enhancing user experience. (G1-1)*
– *"Due to the emergence of Internet of Things, there are a wide range of devices connected across diverse industries… Collecting data through big data analysis allows organisations to explore demands from customers, and forecast market trends." (2017 annual report of Tech M)*

e. Implementation of insurance technology and telematics technology

– *"The crux of insurance technology lies in improving user experience through innovative technology rather than providing premium discount." (G1-1)*
– *"As the applications of InsurTech is increasing… Insurance companies can collaborate with technology firms and start-ups to form an ecosystem to face the rise of autonomous vehicles." (OD-FSC)*
– *"Telematics insurance approved by Regulator can calculate insurance premiums by identifying the risk level of individual driver without installing any large telematics equipment." (OD-FSC)*

2. The entry of the first mover

a. Insurer T as the first mover of telematics insurance triggered other insurance companies to participate in the market

– *"Tech C and Insurer T collaborated to provide the very first telematics insurance service in Taiwan by calculating insurance premiums based on analysing real-time driving behaviour." (Online news article: 17. Nov. 2016)*
– *Other insurance companies started developing various techniques to collect driving behaviour. They tried to draft the design of telematics insurance by referring to the design of Insurer T's telematics insurance. (T10-1, R1)*
– *"Some [insurance companies] started developing telematics insurance after we submitted it… I know that some insurance companies developed telematics insurance without issuing any telematics insurance policies. It was because their top management teams recognised that they should also participate in this considering telematics insurance was a new type of insurance." (T10-2)*
– *"When Insurer T appeared [became the first mover in the telematics insurance market], then we [Insurer] started thinking that we should also follow [begin developing telematics insurance]." (G2-1)*
– *"When there is an insurance company which became the first one to offer certain services, then other top insurance companies would follow by developing similar services in the market." (T7-2)*
– *"When the news broke that we [Insurer T] were preparing to develop the first telematics insurance in Taiwan… other insurance companies were watching us. Meanwhile, they feared that our market share would increase as we develop the first telematics insurance in the market." (T2-2)*

b. Regulator approved the telematics insurance of Insurer T

– *"It is hoped that with Insurer T as the first insurance company [approved by Regulator] presenting telematics insurance as an innovative product… other insurance companies would be more willing to provide more complete services to the public." (OD-white paper)*
– *"Tech C [as the business collaborator of Insurer T] launched the very first telematics insurance scheme…" (Online magazine article: 17. Jan. 2017)*
– *"We [Insurer T] spent quite some time consulting with Regulator… and eventually [it was approved by Regulator] we became the first insurance companies to provide telematics insurance in Taiwan." (T8-NP)*

c. Unfair calculation of traditional motor insurance premiums

– *"Many fleet management companies complained that it was unfair that they were charged the same motor insurance premium regardless of their driving distance. And we [Insurer T] also thought that it [premium calculation] did*

seem unfair. Therefore, after receiving the complaints, we started investigating the concept of telematics insurance." (T2-2)

- *"Insurance companies had to regularly examine their premium rates every year. However, adjusting premium rates did not solve the problem in motor insurance since this current premium calculation approach did not consider the differences between low-risk drivers and high-risk drivers." (G2-2)*
- *"Some of our salespeople reported that customers have been complaining that the motor insurance premium was too high even though he or she did not even use the car…" (G1-2)*
- *"Tech C stated that low-risk drivers often griped about the injustice of extortionate insurance premiums." (Online news article: 5. Dec. 2016)*
- *"The premium calculation of traditional motor insurance was unfair as the premiums of low-risk drivers were used to compensate for that of high-risk drivers… Hence, telematics insurance was anticipated to correct the driving behaviour of high-risk drivers by charging them higher motor insurance premiums." (C1)*
- *"It [the premium calculation of traditional motor insurance] was unfair... Currently, motor insurance quotes of females are lower than that of males in Taiwan… Therefore, most people tend to register vehicles under a female's name, yet the reality is that most drivers are males." (IA)*

Mechanism (S1M)

3. Investigating the value of developing telematics insurance

a. Insurer T conducted studies to analyse telematics insurance

- *"There was this time that we were in contact with an international re-insurance company. It shared with us about the concept of telematics insurance… and we further asked the international re-insurance company to provide us more detailed information about telematics insurance…. We then collected cases of telematics insurance, which were provided by more than ten insurance companies abroad. We looked into how they collected those risk factors, what were the approaches or devices they used, and how they developed the pricing model of telematics insurance. It was not until we conducted such studies that we realised the concept of telematics insurance and how it could be operated… We evaluated the means of collecting driving data. One way is to collaborate with technology firms like Tech C which already developed and manufactured telematics device. The other way is to participate in research projects to use research funding to develop telematics technology." (TC)*
- *"When they [Insurer T] were developing telematics insurance, they referred to some of my publications for guiding their directions [of developing telematics insurance]." (C1)*
- *T4 labelled an incident as 'Brainstorming for telematics insurance', stating that "We had to brainstorm for the structure of telematics insurance regarding the pricing model, target customers, and the goal etc." (T4-CIT)*
- *"We collected telematics-relevant information about the rationale and risk factors of telematics insurance in other countries." (T5-1)*

b. Insurer G conducted market research

- *"We conducted market research by studying the feasibility of telematics insurance in the early stage. We gathered research reports and information about the telematics insurance being offered in developed countries… Then we conducted field research regarding the local market and acceptance of the market, and so on. Afterwards, we also conducted in-depth interviews with insurance practitioners and the general public to understand their perceptions towards telematics insurance…" (G1-1)*
- *"There are two ways of achieving telematics insurance, namely telematics applications and telematics devices. We evaluated the two types of telematics technology [telematics applications and telematics devices] before we started developing telematics insurance." (G3)*

c. Other insurance companies gathered information to understand telematics insurance

– *"I received a call from the R&D department of an insurance company… In the phone call, they asked whether we [salespeople] recognised telematics insurance as good or bad and whether telematics insurance was valuable for the company since they would like to develop telematics insurance." (T6-2)*

d. Opportunities of telematics technology identified by Tech C

– *"The service offered by Tech C allows customers to adjust insurance premium rates based on an analysis of driver behaviour and rates will change based on the analysis results." (OA)*

– *"What Tech C wanted to achieve is to integrate all the telematics devices so that it could collect a wide range of driving data." (T1-2)*

– *"The goal of Tech C was to increase the market share of its telematics devices and sell more telematics devices through telematics insurance." (T3-NP)*

e. Opportunities of telematics technology identified by Tech M

– *"The company has been providing information services for the insurance sector, which serves as the foundation to integrate the big data analysis of telematics in the insurance sector… The company will focus on the research and development project of telematics insurance in the early stage…" (2015 annual report of Tech M)*

– *"Even before Regulator sent official documents to NIA [to initiate the development of the public version of telematics insurance], we [Tech M] had been studying the utilisation of telematics technology in the insurance sector with other insurance companies." (M1-2)*

– *"We were regularly in touch with senior executives of insurance companies, which allowed us to understand which directions insurance companies would like to proceed in the future." (M1-2)*

– *"We had developed nine factors in relation to driving behaviour since adding driving behaviour could improve the accuracy of the calculation of motor insurance premiums." (M1-1)*

– *"Tech M established a team to learn and develop its technology capabilities of telematics technology. It [Tech M] became interested in developing the application of telematics technology since it had already collected a number of data from a public version of telematics insurance and all underwriting and claims records." (G2-2)*

f. The benefits of telematics insurance for Regulator

– *"FSC estimated to have more than 10 insurance enterprises to be willing to invest in the development of financial technology." (FSC White Paper)*

– *"If telematics insurance is successfully developed in the sector, it could indicate that FSC is promoting financial technology… The aim of FSC was to move the country forward…" (T1-2)*

– *"As the government aimed to provide telematics insurance, it pressured Regulator to think about integrating technology into insurance. Hence, Regulator supported us to develop telematics insurance at the time we [Insurer T] submitted the first telematics insurance to Regulator." (T10-2)*

– *T2 labelled a circle as Regulator and said "Regulator required [to present] performance. Therefore, it [Regulator] supported us since we were the first [to develop telematics insurance]." (T2-NP)*

– *"The development of telematics insurance can be an achievement for Regulator as the public may view telematics insurance positively and think that Regulator has done a great job [of eliminating the unfair premium calculation]… The public will think that Regulator is open-minded to innovation rather than strictly managing it." (G1-2)*

g. A potentially negative impact on motor insurance revenue

- *"Our result from market research suggested that telematics insurance was not worth a huge investment since it could create a negative impact on the revenue of our traditional motor insurance." (G1-1)*
- *"From the viewpoint of our salespeople, it would be challenging and costly to distribute telematics devices..." (G3)*

h. Potential high cost of investment for developing telematics insurance

- *"Insurance companies gave up on participating in IRI's plan of developing telematics insurance services since the cost of investment in telematics devices was expected to outweigh the benefit for insurance companies." (MA)*
- *"Insurance companies were facing three main concerns during the implementation of the public version of telematics insurance: 1) A significant amount of investment since each telematics device costs around NTD3,000 and there was an additional charge for using the internet to upload the data. 2) Even if insurance companies provided telematics devices for free, they were not sure whether there would be enough consumers who were willing to participate. 3) There might be a negative impact on the sale of traditional motor insurance. The notion of telematics insurance gives a premium discount to low-risk drivers, yet it might discourage high-risk drivers to participate. This might result in a decrease of premium income of traditional motor insurance for insurance companies." (MA)*

i. Experiencing concerns about corporate image

- *"We [Insurer G] don't want to let people think that we, as a top insurer in the market, did not have the ability of develop this new type of insurance [telematics insurance]. We want to create an image that we are growing together with technology advancement… Normally, we prioritise securing our market share, but we don't want to let people think that we are too rigid to innovate." (G1-1)*
- *"We [Insurer G] did not want to make the public think that we cannot develop innovative services such as telematics insurance… since we are a top insurance company in the market." (G1-1)*
- *"When Insurer T became the first to launch telematics insurance, an executive from a top insurance company told me that the top management team questioned them why they were not the first mover and they felt embarrassed [for not being the first mover in the market]." (IA)*

j. Market competition

- *"What I can be certain of is that they [other insurance companies] did not actively invest in it [developing telematics insurance]. Why would those top insurance companies develop telematics insurance? It was because they [top insurance companies] acknowledged that they must develop telematics insurance since small insurance companies had already developed it." (T7-1)*
- *"After Insurer T announced the launch of telematics insurance… as you know the nature of market competition… our top management team thought that we should also develop something similar since we are a top insurance company." (G2-1)*
- *"I was aware that some insurance companies developed telematics insurance just because their top management team required them to develop it." (T10-1)*

k. Having to innovate while protecting customer rights

- *During the conclusion session of FSC's presentation about the FinTech Development Promotion Program, FSC emphasised the concept of "responsible innovation" to encourage financial service innovation while still protecting customer rights and interests." (OR1)*

Outcome (S1O)

4. Assessment of value

a. Promote the development of financial technology

- *"Goals to achieve in the insurance sector: … 2) It is estimated to have at least ten insurance enterprises which are willing to invest and be involved in the development of financial technology…" (OD-white paper)*
- *"The successful development of telematics insurance could represent Regulator's efforts [in supporting financial technology]." (T1-2)*
- *"The benefit of telematics insurance for Regulator was that it could be its achievement to make the public think that Regulator has improved the premium calculation of motor insurance and it is not too conservative to accept innovation." (G1-2)*
- *"If telematics insurance is successfully developed and launched, then it could become an achievement [for performance evaluation] for Regulator regarding promoting financial technology." (T2-2)*

b. Improve the driver's driving behaviour

- *"We [Insurer T] wanted to collect the risk factors of telematics insurance so that we can create more effective underwriting rules and reduce our [Insurer T's] loss ratio." (T8-1)*
- *"We believe that telematics insurance not only provides fair premium calculations, but also it could provide customised services to customers… such as claiming services." (TC)*
- *We recognised that telematics insurance might affect individuals' driving behaviour since people might pay more attention to their driving behaviour as their driving behaviour was being recorded. (T7-1)*

c. Encourage cross-sector collaboration

- *"Insurance regulatory requirements are difficult to meet for FinTech companies since they have to fully comply with all insurance regulations despite only possessing certain financial technologies. Therefore, as Regulator, we encouraged insurance enterprises to collaborate with FinTech companies." (R1)*

d. Telematics insurance as a solution for unfair motor insurance premium

- *"FSC is actively encouraging insurance enterprises to integrate financial technology into the sector in order to provide a diverse selection of insurance services to meet customers' needs." (OD-white paper)*
- *"Regulator was aware that if telematics insurance could successfully work, then people can get customised motor insurance premiums based on their driving behaviour." (G2-2)*
- *"While we were discussing with insurance companies, we all considered telematics insurance as an innovation… which we could collect driving data and connect with the databases of insurance companies to develop the pricing model for telematics insurance together ... Also, we would like to implement social justice by providing fair premium calculation of motor insurance. For instance, people with high-risk driving behaviour should be charged higher insurance premiums." (M1-1, M1-2)*
- *"The company has invested in the research and development of telematics insurance services. Insurance companies would be able to develop the pricing model of telematics insurance based on telematics applications which could collect and analyse driving behaviour." (2016 annual report of Tech M)*
- *"The company aimed to help insurance companies collect and analyse driving data and develop the pricing model of telematic insurance through its telematics technology." (2017 annual report of Tech M)*
- *"With the implementation of big data analysis through telematics technology, telematics insurance could provide reasonable premium discount to the insured. This could enable the premium calculation of motor insurance to be more accurate and fairer." (WP-FSC)*

e. Enhance the reputation of actors

– *"We [Insurer T] were the first insurance company which launched telematics insurance in the country… We believed that the development of telematics insurance had a positive advertising effect." (T3-2)*
– *"We [Insurer G] utilised the development of telematics insurance to enhance our corporate image… so that the public would know that we are not only a time-honoured organisation, but also strive to innovate." (G2-1)*
– *"We would like to create an image that we are not just seeking steady development, instead, we are innovative and getting with the times rather than a conservative company." (T5-2)*

f. Increase the usage of telematics services

– *"Tech C aimed to have its telematics system and devices used in two million cars in Taiwan." (OA)*
– *"Tech C estimates to have at least 300,000 users [which use its telematics insurance service]." (Online news article: 4. Aug. 2016)*
– *"The goals of Tech M were to collect driving data, verify its data analysis approach, and it also hoped that telematics insurance could be popularised [widely used by customers]." (G2-2)*

g. Decide to adopt a defensive strategy

– *"Due to the result of our market research, we decided to adopt a defensive strategy whereby we developed telematics insurance just to let the public know that we are providing this service. However, we did not invest in marketing, and we did not intend to sell it." (G1-1)*
– *"If you look at telematics insurance services offered by those top insurance companies, they just used telematics insurance to enhance their corporate image without actively selling it…" (IA)*

5. Realisation of lack of resources after investigation

a. Realisation of lack of historical driving data to establish the pricing model of telematics insurance

– *"The current premium calculation of traditional motor insurance is obviously unfair since none of the key driving factors, such as driving distance, hard braking or time of driving, are included in the premium calculation. Nevertheless, these factors cannot be used to calculate premium rates without the support of statistical data which can prove that these factors are directly related to the loss ratio of motor." (MA)*
– *"Our Actuarial Dept. encountered the challenge of not having data to establish the pricing model of telematics insurance." (T2-CIT)*
– *"In the beginning when we were developing telematics insurance, we required certain driving data to hypothesise the scenario of premium calculations… However, no insurance company had comprehensive data, such as sudden braking, acceleration or driving distance, to build the pricing model for telematics." (TC)*
– *G2 labelled one incident as 'Data collection' and said, "Despite us having collected some data while participating in the public version of telematics insurance, we realised that it was not enough for us to develop the pricing model of telematics insurance." (G2-CIT)*
– *"While we were developing telematics insurance, we were restrained from not having historical data to establish the pricing model." (G2-1)*
– *"The premium calculation model of telematics insurance has never been established. For instance, to what extent do sudden braking, acceleration or driving distance influence the premium calculation?" (C1)*

b. Realisation of lack of technology capabilities

– *"Insurance companies required experts in developing telematics applications, integrating systems and collecting and transmitting driving data because they did not have these technology capabilities and devices." (M1-1)*
– *"We did not have the capability to collect and analyse driving behaviour and we had to collaborate with external business collaborators for the integration of such technology." (G1-NP)*

– *"Both the investment of hardware and software and IT human resources were just the weakness of our company." (T3-2)*

c. Realisation of lack of qualification to conduct insurance activities

– *"The minimum paid-in capital for the application to establish an insurance company is NTD two billion." (IR1)*

– *"An insurance enterprise may not commence operations unless it has received permission from the competent authority, completed establishment registration, posted bond, and secured a business licence in accordance with the law." (IR2)*

– *"We wouldn't want to compete with them [insurance companies] since we [technology firms] are not eligible to sell insurance." (M1-1)*

– *"It [organisations outside of the insurance sector] will seek to collaborate with insurance companies to enter the market. It won't try to become an insurance company because it has to be supervised and regulated by Regulator while being an insurance company." (G1-1)*

Appendix 3. Activities audit of Stage 2 in value platform evolution

Context (S2C)

6. Telematics technology as a new concept in the sector

a. Telematics insurance was a new concept in the insurance sector

– *"Telematics insurance belongs to a part of financial technology which is new regarding the pricing model, the design of insurance policy etc. Therefore, telematics insurance may not belong to insurance companies or insurance agents or insurance brokers… Telematics technology would be developed by technology firms…" (IA)*

– *"Telematics insurance was a new concept for Regulator…" (T7-2)*

– *"Telematics insurance was a new concept for us [Insurer G] and we had to go through our internal auditing procedures many times [in preparation for the reviewing procedure later on]." (G2-1)*

b. Telematics insurance as a new type of insurance had to be reviewed by Regulator

– *"New types of insurance such as telematics insurance had to go through examine-and-approval approach when submitting to Regulator for approval of sale." (T2-CIT)*

– *"There are different approaches to submit insurance products to Regulator, namely examine-and-approval and use-and-file. We [Actuarial Dept.] suggested going through the examine-and-approval approach since it [telematics insurance] was a very new type of insurance." (T10-1)*

– *There were many academic units doing research in telematics technologies. (G2-2)*

7. The impetus to collect driving data to establish the pricing model of telematics insurance

a. The pricing model of telematics insurance required the usage of driving data

– *"Sufficient statistic data was required to establish the pricing model of an insurance policy in the early stage of insurance development." (OMA)*

– *"The premium calculation model of telematics insurance has never been established. For instance, to what extent do sudden braking, acceleration, driving distance influence the premium calculation?" (C1)*

– *"More driving data needs to be collected in order to develop the pricing model of telematics insurance specifically in Taiwan…" (ONA)*

b. Lack of driving data

– *"Our Actuarial Department was not able to develop the pricing mode of telematics insurance since we did not have historical driving data… Therefore, we obtained driving data from a fleet management company in order to obtain driving data." (T2-CIT)*

– *"The development of telematics insurance required cross-sector collaboration since insurance companies required driving data to calculate insurance premiums… Now insurance companies only can collect such driving data from their customers." (IA)*

c. Requirements of telematics technology to transmit data

– *"Insurance companies must collaborate with a company which can help them collect and transmit data. They [insurance companies] cannot do it [develop telematics insurance] on their own [with their level of technology capabilities]." (M1-1)*

– *"Telematics device is a must to collect driving behaviour… We [Insurer T] had to figure out a way to collect data." (TC)*

– *"To collect driving behaviour, an application programming interface (API) was required to be developed to link systems between the insurance company and the technology firm." (T5-1)*

Mechanism (S2M)

8. Clarifying the adequacy of telematics technology

a. Regulator was unable to predict the trend of telematics insurance services

– *"The challenge insurance companies encountered was to what extent the Regulator can accept [telematics service innovation]… Since insurance enterprises hadn't started selling telematics insurance, we [Regulator] couldn't know whether it was good or bad. Therefore, we [Regulator] agreed that these insurance companies can work on it first. If they [insurance companies] still want to upgrade [telematics insurance products], then we can further examine or review to decide whether to approve those upgraded products." (R1)*

b. Past experiences of innovative insurance being discontinued by Regulator

– *"Even though telematics insurance policy didn't require prior approval based on the regulation at that time, it involves financial technology and was a new and emerging concept… It was Regulator who interpreted regulations… We had several experiences in which Regulator made us discontinue insurance policies which did not even violate regulations… Although insurance regulations are pre-determined, these regulations may be outdated for managing new types of insurance and regulating advance technology implemented in insurance." (T10-2)*

c. Consult with Regulator about the concept of telematics insurance

– *"In the early stage, we [Insurer G] consulted with Regulator regarding our idea of telematics insurance in order to obtain verbal consent." (G1-2)*

– *"Since telematics insurance was a really new concept at that time… Once we had decided to develop telematics insurance, we consulted with Regulator in advance [regarding whether Regulator could accept the concept of telematics insurance]. If Regulator could not accept such concept, then there is no need to even submit our telematics insurance for reviewing." (T10-1)*

– *"While we were in the reviewing procedure, our IT Department had already coordinated with business collaborators to develop telematics insurance on the IT aspect… However, we dared to do this because we had already obtained the verbal consent from Regulator in advance… So that we could be sure that Regulator would not reject us [in the reviewing procedure]." (T4)*

– *T4 labelled an incident as Communicate with Regulator and said, "We consulted with Regulator regarding the concept of telematics insurance. And Regulator raised questions about the risk factors of our telematics insurance. Then we modified the draft design based on Regulator's opinions. These all happened prior to the reviewing procedure." (T4-CIT)*

d. Internal auditing during the development process

– *"When we were developing the product, we went through the preparation procedures with the Actuarial, Loss Prevention, Risk Management, Compliance, and Auditing departments several times. This is to make sure everything is fine before submitting such new product to the regulator. This way, we know better regarding where to pay more attention in the regulation details." (G2-1)*

– *"Our company values the internal auditing procedure [in preparation for submission for reviewing]. Such procedure would allow those departments to examine whether the design of telematics insurance conforms with insurance regulations." (G2-NP)*

e. Made presentations to Regulator

– *"Since telematics insurance belonged to financial technology and telematics technology seemed to change the way we design insurance policies [which we were not sure how Regulator would interpret it], our CEO made a presentation [of our telematics insurance] to Regulator before we initiated the development." (T10-2)*

– *"Telematics insurance was a really innovative idea from a practitioner's perspective. When we presented our idea to Regulator, they [Regulator] were forced to look into the concept of telematics insurance…" (T7-2)*

9. Approach potential business collaborators to exchange information and ideas

a. Approach potential business collaborators with technology capabilities

- *"We had approached many potential business collaborators to discuss the idea of telematics insurance." (T2-CIT)*
- *G2 labelled an incident as Consulting with potential business collaborators about the data collected in the telematics application. (G2-CIT)*
- *"Although Tech M was familiar with the insurance sector, telematics insurance was such a new concept which it had been learning… Hence, we approached Tech M about our ideas, and they were willing to work with us to develop telematics insurance." (G1-2)*
- *"Telematics device is a must to collect driving behaviour… Tech C was already collecting driving behaviour through its telematics system and telematics device… Tech C happened to have the technique while we [Insurer T] had to figure out a way to collect data." (TC)*
- *"While we were searching for business collaborators with telematics technology, we had discussed with a telecommunication company and a computer manufacturer etc… Nevertheless, it was obvious that their techniques were still prototypes, which could not be adopted flexibly." (T10-1)*

b. Concerns of information and ideas being leaked by business collaborators

- *"During the process of discussing with potential business collaborators, there were things which have to be carefully explained to the potential collaborator. For instance, we cannot say what we have. However, if we have to develop new services [telematics], we have to talk about it. Thus, it is difficult to handle such situation… I have heard some executives question this [issue] that since Tech C was collaborating with us [Insurer T], maybe it will simultaneously interact with other insurance companies by sharing its experience of collaborating with us with other insurance companies." (T8)*
- *"Of course, we [Insurer T] were concerned that Tech C would share this information [with other insurance companies]. It is impossible that Tech C was only in contact with us. After all, we are neither a leading insurance company nor the biggest insurance company." (T2-1)*

c. Insurer T selectively reveal ideas to business collaborators

- *"As we were interacting with Tech C, we only revealed our [essential] ideas. We would not share any of the confidential information with Tech C. Eventually, as we collaborated with each other longer, we developed a mutual understanding regarding what can or cannot be discussed." (T1-1)*
- *"Although we collaborated with the business collaborators for their techniques, we kept the know-how and core information within the company. We did this because we were concerned that if we share the core information with our business collaborators, they may approach other insurance companies [for collaboration]. This information may not be suitable for other insurance companies. However, they can still take advantage of our know-how to a certain extent." (TC)*
- *"It is due to such engagement processes that we have learned to let the potential collaborators know what we want to achieve and let them talk about what we want to know even though we [Insurer T] are not going to collaborate with it… During the engagement process, there were things which have to be carefully explained to the potential collaborator. For instance, we cannot say what we have. However, if we have to develop new areas (telematics), we have to talk about it. Thus, it is difficult to handle such situation… Tech C would not only collaborate with our company. Therefore, [we had to be careful of] how to balance between exchanging know-how and keeping confidentiality… There are some things [data and information] which we need Tech C to provide us, but they will know these data and information once they provide them to us. Hence, I think this requires the wisdom of executives and staff to [manage between trust and collaboration]." (T8)*

d. Approach an existing business customer for driving data

- *"Since the fleet management company [Logistic K] had driving data because all of its fleets are equipped with telematics devices, therefore, we [Insurer T] were able to acquire such driving data while other insurance companies struggled with this issue." (T2-CIT)*
- *"Since we had to obtain driving data, we communicated with Logistic K to get their driving data since it is one of our business customers." (T5-CIT)*

e. Concerns of data leakage

- *'Logistic K was our business customer and it had installed telematics devices in all of its fleets that record driving behaviour, such as driving distance, time of driving etc… In the beginning, while we were presenting our idea of developing telematics insurance, the manager of Logistic K was concerned about Insurer T's request and was not willing to provide the data… Eventually, I successfully convinced the manager to share the data with us by presenting the information about telematics insurance in other countries regarding the successful cases, reports, and statistics." (T5-fieldnote)*

f. Approach insurance companies

- *"We sought to collaborate with insurance companies and explained our ideas and technology capabilities of data collection and big data analysis for driving behaviour with non-life insurance companies. We not only collect driving data, but we have R&D department." (M1-1)*
- *"Tech C worked hard to gain the trust of the insurance sector, and the CEO stated that 'We created a flexible platform that reduced the need for large investment.'" (OA)*

10. Select business collaborators

a. Unable to select trustworthy telematics techniques

- *"While seeking business collaborators with telematics technology, a telematics technique provided by a telecommunication company was highly recommended by the Loss Prevention Department since its telematics application could come up with a score of driving. Nevertheless, the telecommunication company was not willing to explain how the score is calculated at the backstage. Thus, we would not trust how it processed driving data since our company [Insurer G] was conservative." (G2-1)*
- *"During the process of consulting with potential business collaborators to select the right one… several technology firms had presented their telematics technology to us [Insurer G]. Every technology firm seemed very capable; however, no one was willing to share how they analysed driving data. And it was at this moment I recognised that insurance companies were in a relatively weak situation regarding developing telematics applications." (G2-CIT)*
- *"A concern about telematics insurance was the data analysis approach of driving behaviour, data authenticity, and the source of driving data offered by business collaborators." (G2-2)*
- *"Our weakness is that we didn't know how Tech M made calculations, even though it kept telling us that it can share the calculation with us. We didn't have that type of know-how [analysing driving behaviour], and we didn't have the appropriate employees to connect the telematics system of Tech M back [to our system]". (G3)*
- *"Many potential business collaborators bragged about their achievements in telematics technology in different countries… However, when we [Insurer T] really checked closely into them, we noticed that some just exaggerated…" (T8)*

b. Decide to collaborate with existing business partners

- *"The reason we collaborated with Tech C was because it was willing to provide us a certain amount of telematics devices for free. Therefore, we had almost zero cost to let customers use the devices… We collaborated with Tech W because it was our existing business collaborator for maintaining our official website." (T3-1)*

– *"Since Tech M had been involved in the development of a public version of telematics insurance, we [Insurer G] approached them [Tech M] to discuss the collaboration." (G2-1)*
– *"The reason why we decided to collaborate with Tech M was that it has been a trustworthy partner for storing data for all insurance companies [including Insurer G]… Additionally, it had previous experience in participating in the development of the public version of telematics insurance." (G2-2)*

c. Decide to collaborate with business collaborators with complementary resources

– *"We [Insurer T] decided to collaborate with Tech C because it had already developed a system to collect driving behaviour… Hence, it was a match that we had such requirement [to collect driving data], and it [Tech C] had such a technique [telematics technology to collect driving data]." (TC)*
– *"We [Insurer G] collaborated with Tech M to develop our telematics application because it had already invested resources to develop [a structure for] telematics applications. So now Tech M were making a telematics application for us by modifying the ready-made structure of telematics application based on our requirements." (G1-1)*

Outcome (S2O)

11. Establish collaborative relationships with selected business collaborators

a. Signed contracts and non-disclosure agreements to form collaboration partnerships

– *"We [Insurer T] began consulting with Tech C about our ideas of telematics insurance. Afterwards, a letter of intent was signed." (T7-1)*
– *"We signed non-disclosure agreements with Tech C to prevent it from leaking the confidential information of our company [Insurer T]." (T1-1)*
– *"To prevent Tech C from sharing information with other insurance companies, we signed non-disclosure agreements to limit it [the behaviour of Tech C]" (T2-1)*
– *"In November 2016, our company collaborated with Tech C to release telematics insurance…" (2016 Annual Report of Insurer T)*
– *"Insurer T was granted access to the data of driving distance and claiming records within a 3-year period from Logistic K. A non-disclosure agreement was signed to make sure that the driving record provided by Logistic K would not be leaked." (T5-fieldnote)*
– *'In the area of implementing telematics technology, the company has signed contracts and Memorandum of Understanding (MOU) with two non-life insurance companies [one was Insurer G].' (2017 annual report of Tech M)*

12. Consents were given by Regulator to begin developing telematics insurance

– *"Since it was that period which financial technology was emerging, Regulator supported us [permitted Insurer T to start the development] when we consulted with it about the idea of developing telematics insurance." (T10-1)*
– *"Some insurance companies did not catch the guidance regarding the areas which Regulator would like insurance companies to explore in financial technology. Regulator discontinued those insurance policies which did not follow its guidance regardless of the investment insurance companies already made." (T1-1)*
– *T4 drew Regulator at the top part of the drawing and said, "We began developing telematics insurance once we received the verbal consent from Regulator." (T4-NP)*
– *"Regulator supported us [Insurer T] to develop telematics insurance [by expressing consent to us] since we were the very first insurance company that invested in the development." (T2-NP)*
– *"In the early stage, we [Insurer G] consulted with Regulator regarding our idea of telematics insurance in order to obtain verbal consent." (G1-2)*

Appendix 4. Activities audit of Stage 3 in value platform evolution

Context (S3C)

13. Service innovation requires a combination of complementary resources

- *"Two analytical models are required to be established. One is to collect real-time data such as driving distance and time of driving through telematics devices in order to evaluate the driver's risk. The other is that such result from the evaluation will be combined with the information of the vehicle and the driver and his or her claiming record." (Online news article: 19. Jun. 2016)*
- *"The industrial chain of telematics insurance comprises a wide range of organisations such as telematics device providers, insurance companies, system integrators, software companies etc. Therefore, cross-sector integration and value-added services will become the key points for promoting telematics insurance." (Online news article: 19. June. 2016)*
- *"Data transmission in telematics insurance was not something insurance companies could solely achieve… Transmitting such huge amounts of driving data required technology firms… since insurance companies were not experts in vehicles. Therefore, insurance companies had to either adopt joint ventures or collaborate with technology firms or establish labs for developing insurance technology… Otherwise, organisations in other sectors [which sought to enter the insurance sector] will become competitors for insurance companies." (C1)*
- *"The system of Tech C and that of ours had to be integrated in order to transmit the collected and analysed driving data." (T3-1)*

14. Regulatory requirements

a. Insurance regulations indicate that insurance policies had to go through a reviewing procedure

- *"Before selling any type of insurance product, an insurance enterprise shall comply with all of the procedures set out in these Regulations, except where otherwise provided by applicable acts or where the competent authority has given approval for a product of a special nature." (IR)*
- *"It was due to the requirement of insurance regulations that telematics insurance had to be approved [by Regulator] before the launch of it. Therefore, we had to present our design of telematics insurance to senior executives in Regulator… Eventually, it [Insurer T's telematics insurance] was approved." (T7-NP)*

b. New types of insurance had to be approved prior to sale

- *"For the following non-life insurance products, an insurance enterprise may commence sale only after applying for and receiving approval from the competent authority, unless otherwise provided by the competent authority: 2) A new type of individual insurance product. Standards for determining what qualifies as a 'new type of insurance product' shall be drafted by NIA and reported to the competent authority [Regulator] for review." (Article 16 of Regulations Governing Pre-sale Procedures for Insurance Products)*
- *"The Taiwanese society has low mistake tolerance, which means every step that FSC opens up would require thorough risk management mechanisms." (MA-FSC)*
- *"Regulator was restructured with functions of its four divisions being transformed to General Supervision, Non-Life Insurance Supervision… For Non-Life Insurance Supervision Division – Supervision and Management of Compulsory Automobile Liability Insurance…, non-life insurance, corporate governance, non-life insurance products, new types of non-life insurance products, and insurance groups." (WP-Regulator)*

Mechanism (S3M)

15. Combine telematics technology with insurance

a. System integration through technology capabilities

- *"To successfully develop telematics insurance, telematics technology had to be integrated into insurance since the two required data exchange. Technology firms could only collect driving data such as hard braking and accelerating, while we [insurance companies] only have the vehicle information and drivers' personal information…" (T3-2)*
- *"Tech C not only provided telematics devices but integrated its systems into our insurance systems. Additionally, Tech W integrated our website into the telematics application." (T8-NP)*
- *"Information systems of insurance companies and technology firms were required to develop telematics insurance since data had to be collected and processed through the system. Then the result of data analysis had to be provided to end users." (G3-NP)*
- *"Once the systems of Tech M and that of ours [Insurer G's systems] were integrated, the telematics application was released and re-tested prior to the launch." (G2-CIT)*
- *"The big data analytics services were developed, and the systems were integrated into the system of insurance companies regarding certain customer information to achieve the provision of telematics insurance services." (2017 annual report of Tech M)*

b. Actors exchange data and knowledge

- *"Once we [Motor Insurance Department] received the transmitted data of driving behaviour from Tech M, the data was then provided to Corporate Planning Department to develop the pricing model of telematics insurance." (G2-NP)*
- *"During system integration, our [Insurance T] requirements were that the identification of licence plate numbers would be significantly accurate. However, Tech W would reply to us that it could only reach 50 per cent identification accuracy or there were certain technical challenges. Then we would express to Tech W that we will not be able to develop telematics insurance with 50 per cent accuracy since accuracy was a key point for us... Therefore, we communicated with Tech W about our requirements and requested it to improve the accuracy. Eventually, Tech W spent some time to reach the accuracy and integrate the technique into the system." (T4-CIT)*

c. Use driving data to develop the pricing model of telematics insurance

- *Insurer T acquired driving data such as driving distance and claiming records from Logistic K within a three-year period so that it could develop the pricing model of telematics insurance. (T5-fieldnote)*

d. Communication gaps between insurance companies and technology firms

- *"It was easier for us [insurance companies] to understand them [technology firms], while it [Tech C] seemed to struggle with understanding our standpoint as an insurance company… It [Tech C] neglected to consider that insurance companies were restrained from insurance regulations since we [insurance companies] were a supervised sector. Sometimes, it just did not seem to understand our situation. We had to explain to it [Tech C] and it had to align the design with regulatory requirements." (T7-2)*
- *"However, Tech C was not willing to modify the structure of its telematics technology in the beginning despite only certain data needing to be transmitted in order to protect the personal information of the driver [according to Personal Data Protection Law]… Therefore, both sides went through an adjustment period." (T3-2)*
- *"Our IT Dept. and Tech M's IT Dept. had spent quite some time integrating the systems… When the communication occurs across two organisations [Insurer G and Tech M], this is doubly hard for us. It is even more difficult when IT departments of both organisations communicated. We [project management team] usually passed on our IT Dept's message to the project management team*

of Tech M because the IT departments did not directly communicate with each other. Therefore, we organised a video call meeting so that the IT Dept. of both organisations can directly communicate. Otherwise, we cannot understand what our IT Dept. told us, nor can we understand what the IT Dept. of Tech M told us… Anyway, we just cannot understand. Hence, it would be more efficient for them to communicate directly. And this is why the early phase of this project was relatively problematic… We [Insurer G] spent a lot of time communicating with Tech M about the transmission frequency and data specification. Eventually, we developed shared definitions to reach the same understanding and reduce communication gaps." (G3)

- *"Tech C had specific ideas for developing telematics insurance. For example, Tech C thought that a rebate mechanism could be implemented in telematics insurance… Nevertheless, Tech C was not aware that the insurance sector is a regulated industry in which the pricing of telematics insurance is carefully managed..." (T7-1)*
- *"Sometimes our schedule of developing telematics insurance was not as expected. Take the telematics application for example: Tech W initially set driving distance and the corresponding discount." (T7-2)*
- *"There were times when we possessed different opinions from Tech M… Although Tech M had already developed a telematics application, it had to fulfil our requirements for member registration and encryption." (G2-1)*

16. Reviewing the eligibility of telematics insurance

a. Review telematics insurance after submission

- *"[Once telematics insurance policies were submitted to Regulator,] Regulator organised Reviewing Committees, formed by officials of Regulator, executives in NIA and IRI, and academic scholars, to evaluate telematics insurance." (G3-NP)*
- *"Telematics insurance was submitted to Regulator for reviewing since it had to be approved by Regulator [prior to the launch]." (T10-NP)*
- *"Certain information security issues have emerged as mobile applications have been used to provide financial services… Since mobile applications easily create vulnerabilities which could potentially cause invasion of privacy… Therefore, more attention has been paid to the security checklists of mobile applications." (FSC-white paper)*
- *"When I was involved in the development of telematics insurance, it was noticed that Regulator influenced the process significantly… You could feel that the insurance sector is highly regulated and does not allow insurance companies to do things freely." (T1-2)*

b. Lack of understanding regarding the design and operation of telematics insurance

- *"The concept of telematics insurance was too innovative… that the Reviewing Committee members literally did not know or understand what telematics insurance was about during the reviewing procedure. They raised several weird questions to us [Insurer T]. Eventually, we had to provide examples to help Regulator understand how telematics insurance was achieved. We [Insurer T] had to convince Regulator that our product was reasonable." (T10-1)*
- *"We [Regulator] may understand explanations of concepts from insurance companies. However, when it was about the operation [of telematics insurance] we could not understand it properly since we used different terms from insurance companies. Therefore, we [Regulator] had to spend more time trying to comprehend what insurance companies were talking about." (R1)*
- *"Regulator's biggest concern about the development of insurance technology was that its role as the supervisor would be weakened if it doesn't have the right to manage all the players in the sector." (C1)*

c. Concerns about customer data protection in data transmission process

– *"The only concern for insurance companies in innovation is the regulatory restrictions such as [restrictions around] personal information. It is because of the restrictions from the regulation that we [insurance companies] cannot provide things like personal information to our business collaborators. Moreover, insurance companies are not allowed to be in touch with business collaborators to a certain extent. This is a relatively big problem for us while facing external collaboration." (G1-1)*

– *"We [Regulator] are not against opening up to innovation; however, we have to protect whatever we [as the regulatory agency] have to protect such as consumer rights." (R1)*

d. Modify the design of telematics insurance based on the corrections received in reviewing

– *"We [Insurer T] received certain suggestions from Regulator after the reviewing, and we adjusted the design of telematics insurance according based on the suggestions." (T4-CIT)*

– *"During the reviewing process, Regulator raised some of its concerns, and we [Insurer T] required Tech C to amend relevant issues [by aligning with the corrections]." (T7-2)*

– *"We [Insurer T] requested Tech C to provide the information around its domain privacy protection of telematics insurance. Since telematics insurance involves data transmission, domain privacy protection was considered as an important aspect during financial examination… Tech C had to keep providing whatever documents required during financial examination." (T1-CIT)*

– *"We managed to figure out an appropriate solution to deal with member registration and encryption after communicating with Tech M." (G2-1)*

e. Data partitioning and data masking to protect customers' personal information

– *"When it comes to dealing with customers' personal information… all the registration data with personal information such as ID number, name and birth data in the application were masked. And these masked data will be transmitted to Tech M. Therefore, when customers are using this application, Tech M can only see the masked data and make further calculations. Tech M can only use these driving data to improve the application; however, it would not know our customer types." (G2-1)*

– *"We partitioned off the data. Tech C owns the data in the cloud, but it doesn't have the personal information [of our customers], whereas we own the personal information without having access to the data in the cloud." (T2-1).*

– *"To protect the personal information of customers, we partitioned off the data so Tech C would not be able to see exact calculated insurance premiums on their side." (T7-1)*

Outcome (S3O)

17. Achievements of service innovation

– *"The pricing model of our telematics insurance was developed by using the collected driving distance from Logistic K and its claiming records to develop risk factors." (T7-2)*

– *"We developed the pricing model of telematics insurance through the usage of driving data and claiming records of a fleet management company [Logistic K]." (T2-CIT)*

– *"We achieved the development of our telematics insurance through the integration of driving behaviour into driving distance." (T7-CIT)*

– *"The telematics insurance scheme of Tech C is underwritten by Insurer T." (Online news article: 5. Dec. 2016)*

– *"Customers transmitted [driving data] to the telematics application. We transmitted data to Tech M, and it transmitted the result [of driving behaviour analysis] to us [Insurer G]." (G3-NP)*

– *"In the aspect of innovative services, the company had achieved the development of driving data analysis and risk factors…" (2017 annual report of Tech M)*
– *"Customers' driving data was transmitted to Tech M's telematics application for analysis. Insurer G received the analysed data from Tech M and provided results to consumers through Tech M's devices. Insurer G purchased the right to use the analysed driving data collected by Tech M to develop the pricing model. Tech M integrated its telematics technology with Insurer G's insurance based on Insurer G's requests to collect and analyse the driving data generated by consumers." (M1-NP)*

18. Obtain approval for sale

– *T2 labelled an incident as "Insurer T's telematics insurance was approved by Regulator" and said, "Since telematics insurance was a new type of insurance, it must go through the reviewing procedure of examine-and-approval by Regulator". (T2-CIT)*
– *"Once we [Insurer T] submitted our telematics insurance for reviewing, there were many questions raised by the Reviewing Committee regarding the design and the premium rate of telematics insurance policy… Eventually, we managed to complete the review procedure [and obtained the approval from Regulator]." (T10-1)*
– *"The pricing model of our telematics insurance was approved by Regulator and the telematics application was released, then we would start selling telematics insurance." (G2-CIT)*
– *"Once the policy of telematics insurance was designed, it was submitted to Regulator for reviewing to obtain approval for sale [so that Insurer G could start issuing telematics insurance policies in the market]." (G3-NP)*

Appendix 5. Activities audit of Stage 4 in value platform evolution

Context (S4C)

19. New services were required to be introduced to the market

a. Telematics insurance was approved for sale

– *"Once telematics insurance is approved by Regulator, there must be certain people and channels such as motor manufactures and financial distribution channels to sell telematics insurance on behalf of insurance companies." (T4)*

– *"Once we received the approval from Regulator, then we launched our telematics insurance service and introduced it to our customers" (T10-NP)*

– *"Once the services of analysing driving behaviour are developed and telematics insurance policies are approved by Regulator, the company will begin with marketing and promotion." (2017 annual report of Tech M)*

b. The concept and application of telematics insurance were new for customers and distribution channels

– *The result of an online survey showed that 98 per cent of the public either had never heard of telematics insurance or did not know much about it. (Summarised from an online survey conducted by an automotive website)*

– *T5 commented that since telematics insurance was not offered by any other insurance companies [which means it was a new idea], consumers struggled with understanding the rationale or were concerned about it. (T5-fieldnote)*

– *"During the process of promoting telematics insurance, we realised that customers needed some time to gradually understand what telematics insurance is in order to accept such a new concept." (T8)*

– *"Once telematics insurance was launched to the market, we had to promote it… we had to inform consumers about this [new type of insurance] and we also had to inform our distribution channels about it." (G1-2)*

– *"For example, our salespeople [and distribution channels] did not understand the concept of telematics insurance. Therefore, we had to disseminate the information about how to operate the telematics application." (T2-2)*

Mechanism (S4M)

20. Promotion of telematics insurance

a. Marketing through distribution channels

– *"Once telematics insurance is developed and launched, you still need marketing. Hence, we coordinated with various channels such as insurance brokers, banks, securities firms, and car insurance dealers [insurance agents] to promote our insurance products… And these distribution channels have their own customers [so that Insurer T's telematics insurance could be reached to a wider range of customers]." (T9-2, T9-NP)*

– *T4 highlighted car dealers and financial channels as external business collaborators of Insurer T. T4 said, "We need our distribution channels such as car dealers and external business collaborators to promote our telematics insurance for us after telematics insurance was approved for sale." (T4-NP)*

b. The concept and application of telematics insurance were difficult to be understood by distribution channels

– *"For example, our salespeople [and distribution channels] did not understand the concept of telematics insurance. Therefore, we had to disseminate the information about how to operate the telematics application." (T2-2)*

– *"We noticed that the information about telematics insurance seemed to be too professional for our salespeople to comprehend when we were sharing the launch of telematics insurance. Thus, we transformed the information of telematics insurance into something easier for them to understand."* (G2-CIT)

c. Lack of incentives to adopt telematics insurance

– *"There were not many people that adopted our telematics insurance services. This was because people had to download the telematics application first and they had to collect driving data for around three months in order to get the*

result of their motor insurance premiums. Such a complex procedure discouraged people from even downloading the telematics application." (G3)

- *"When some of our salespeople offered to install telematics devices for customers, they often rejected it. They asked lots of questions such as 'Why should I install such a device in my car?', 'How much premium discount can I get from using the telematics device?'. They acknowledged the installation of telematics devices as troublesome since they had to schedule a time for the visit of our salespeople." (T3-1)*
- *"Some distribution channels do not allow insurance companies to offer and talk about telematics insurance [unique insurance services] since only Insurer T was providing telematics insurance at that time. Insurance brokers and insurance agents aim to offer insurance services from different insurance companies to avoid losing their customers." (T6-1)*
- *"There were many times that insurance brokers and insurance agents did not welcome insurance companies providing unique insurance services since this would potentially lead to customers preferring specific insurance companies." (T6-1)*

d. Concerned about invasion of privacy

- *"The public was concerned that their whereabouts will be fully recorded by insurance companies through telematics technology." (Online news article: 7. Dec. 2020)*
- *"Many have been deterred by the expense of buying OBD hardware and concerns over privacy." (Online news article: 5. Dec. 2016)*
- *"One of the challenges of promoting telematics insurance was to make the public accept and adopt telematics insurance. How would insurance companies make the public accept the idea that there will be a device installed in their cars to record their whereabouts and driving behaviour? It [telematics techniques] would be considered by some consumers as monitoring their behaviour." (R1)*

e. Conduct education training and distribute materials

- *T9 commented that several customers reported technical issues of the telematics application to him. Hence, he generated a user manual detailing how to renew telematics insurance in the telematics application and shared it with all of the salespeople in Insurer T. (T9-CIT)*
- *"We [salespeople] worked on promoting telematics insurance… the Personal Lines Department sent additional colleagues to do presentations on our telematics insurance to [introduce and explain our telematics insurance to] insurance brokers and insurance agents. Even some of the sales managers and salespeople of our company attended those trainings [to learn more about telematics insurance]." (T6-1)*
- *"Since no sales target was set for the telematics insurance, we only generated a lesson plan to inform the salespeople [of Financial Holding G] about telematics insurance as a new type of motor insurance and its benefits for customers [rather than encouraging salespeople to actively promote it]." (G2-1)*
- *"When our company had developed a unique type of insurance services, we conducted presentations to not only executives but also salespeople in these insurance agents and brokers so that they could have a better idea of the benefits of our telematics insurance for them." (T6-1)*
- *"We implemented training programmes to our distribution channels such as insurance agents and insurance brokers. In the training programme, the origin and rationale of telematics insurance, its benefits for customers, and its benefits for them as insurance agents and insurance brokers were explained." (T8)*

f. Hold marketing activities to announce the launch and attract customers

- *"Insurer T and Tech C held a press conference today to launch the very first telematics insurance service in Taiwan… The CEO of Insurer T commented that the design of telematics insurance could not only reduce the high cost of premiums for the society, but also be environmentally friendly as customers reduce their driving distance." (Online news article: 17. Nov. 2016)*

– *T5 labelled an incident as "The launch of telematics insurance through a press conference" and said, "We invited some senior managers of our business customers such as banks and car manufacturers…" (T5-CIT)*
– *"Regarding the marketing of telematics insurance, we conducted media pitches and organised a press conference with Tech C." (T7-NP)*
– *"When we [Insurer T] were promoting telematics insurance, we informed the public about our telematics insurance services… We and Tech C advertised it together. If people were interested in trying telematics insurance, they could fill out the questionnaire. Then we ran lucky draws to give away around a thousand telematics devices for them to experience our telematics insurance services." (T1-CIT)*
– *"Once our telematics insurance received the approval for sale, then we began with marketing by organising a lucky draw campaign... to encourage people to download our telematics application." (G3)*
– *"We did not actively promote our telematics insurance through salespeople since our telematics insurance was nothing really special [since Insurer G adopted a defensive strategy]. However, we still had to present a bit of sales performance… We ran a lucky draw campaign so that any individuals who had downloaded our telematics application during the campaign could be entered into a draw for vouchers." (G2-2)*

g. Media exposure for telematics insurance

– *"Since customers did not understand or were concerned about [the invasion of privacy due to] the operation of telematics insurance, we created social media content specifically to introduce the concept of our telematics insurance and to address customers' concerns by explaining the way Insurer T processed driving data." (F5-fieldnote)*
– *"Posters and contents of press articles regarding our telematics insurance were created by the Public Relations Department in order to promote our telematics insurance after it received the approval for sale." (T4)*
– *An article was posted by Financial Holding G and an online press article which stated, "The calculation of traditional motor insurance rates has reached a new milestone, which is calculated based on driving behaviour. Insurer G has launched telematics insurance this month which provides premium discounts to customers with safe driving behaviour." (WP-Insurer G, Online news article: 27. March. 2018)*

21. Market reactions

a. Propose the idea of establishing a shared database for storing driving behaviour

– *"Recently, NIA will be inviting all the non-life insurance companies to develop a public version of telematics insurance together for the prospect of the sector." (Online magazine article: 13. May. 2016)*
– *"There was a meeting organised by NIA as other insurance companies were hoping that NIA could develop a database which stores driving data collected by all insurance companies [however, so far only Insurer T had collected driving data]. NIA would like us [Insurer T] to share the driving data that we have already collected with others through the database." (T10-1)*
– *"I was the company's representative for motor insurance in NIA. NIA held several meetings for all insurance companies to discuss the idea of establishing a database which could store all the driving data collected by all insurance companies." (G3)*
– *"The coordination from NIA failed since insurance companies could not reach a consensus [since Insurer T refused to share the collected data]… Therefore, we [Insurer G] began developing our own telematics insurance." (G3-NP)*

b. Different viewpoints towards developing a public version of telematics insurance

– *"However, every insurance company had different thoughts and the budget of investment for development telematics insurance resulted in failure of the public version of telematics insurance initiated by NIA." (G3)*

– *"About three or four years ago, Regulator wanted to know whether it was feasible for telematics insurance to be provided in Taiwan. Therefore, our company [Tech M], IRI, and insurance companies which were members of NIA attended many meetings to try to develop [a public version of] telematics insurance. However, the idea failed to be executed since the concept of telematics insurance was still new and had not been accepted by some insurance companies and consumers." (M1-1)*
– *"In the beginning of 2016, IRI invited four top insurance companies to participate in developing the public version of telematics insurance; however, the project failed since insurance companies could not see the profit from it." (MA)*

c. Unwilling to share driving data with latecomers

– *"Now that other insurance companies were suggesting that our [Insurer T] collected driving data should be shared among insurance enterprises… We [Insurer T] had invested so much money in it [developing telematics insurance], why should we [Insurer T] let other competitors use the driving data we have collected? We were not willing to share more than ten thousand pieces of driving data." (T10-1)*
– *"After Insurer T started promoting its telematics insurance… NIA once tried to be a mediator between Insurer T [as the first move] and other insurance companies [to convince Insurer T to share the collected driving data] since other insurance companies were interested in participating in the telematics insurance market. However, Insurer T did not want to let other insurance companies and hence it applied several patents [to protect its techniques]… That is to say, Insurer T's patents prevented others from participating in the telematics insurance market." (C1)*

d. File patents to prevent others from adopting its telematics techniques or collected data

– *"We were granted ten years of the patent right. Thus, other insurance companies cannot utilise it even if they want to [enter the telematics insurance market]"* (T2-1)
– *"Non-life insurance companies have been actively applying patents for financial technology. Currently, Insurer T has obtained four patents, ranking the top for the time being… Insurer T is the first in the non-life insurance sector to obtain patents for technological innovation, and has also obtained four patents, including telematics..." (Online news article: 27. Feb. 2018)*
– *"With the patents in our hands, we would not have to worry that other insurance companies would steal our intellectual properties. We file patents in preparation for the era of Artificial Intelligence." (T1-2)*
– *Insurer T applied patents to prevent insurance companies from adopting its techniques of telematics insurance. (Summarised from T10-1)*

Outcome (S4O)

22. Service provision

a. Customers experienced fairer premium calculation

– *"Many customers thought that our telematics insurance was great including myself… I purchased telematics insurance for my car… It gave me an insurance premium discount of around 15%… because I seldom use my car... This is a great deal for me." (T2-1)*
– *"There was this manager of an insurance broker company who always insured his car with us [Insurer T]… He loved our telematics insurance and no other insurance companies had launched telematics insurance at that time." (T6-1)*

b. Increase interactions between actors and customers

– *"Our telematics application became a new topic for our salespeople to share with our customers… Customers often get tired of salespeople talking about insurance… So with the telematics application, our salespeople could talk about the application itself, the potential discount it could provide to customers, and how this would help customers improve their driving behaviour." (T6-1)*

– *"Our telematics insurance became a new topic for me to increase the interaction with my customers." (T9-1)*
– *"After we began providing telematics insurance in the market, some customers called us to check whether their driving data had been successfully collected through the telematics application… It was the usage of this application that helped us build closer customer relationships. Typically, our salespeople would have contacts with customers at three specific time points, namely renewing, introducing new products, or when an accident happen to the insured… Now with the provision of telematics insurance, some customers had more contacts with salespeople which increase their interactions." (G2-1)*
– *There were around three or four hundred people who downloaded and used our telematics insurance application. (Summarised from G2-2 and G3)*

c. Wider utilisation of telematics technology

– *"After successfully developing telematics insurance with us [Insurer T], Tech C managed to sell its telematics devices to a fleet management company and other insurance companies… some insurance companies spent a lot of money buying Tech C's telematics devices..."* (T2-2)
– *Tech C received several research grants for the development of telematics technology. (T2)*
– *"The company strives to be innovative in the application of telematics technology… The company successfully received a grant for piloting a more advanced type of telematics technology, which is to further incorporate personal health data into telematics technology. Additionally, we have filed two telematics-related patents this year during the development of telematics insurance." (2018 annual report of Tech M)*

Appendix 6. Activities audit of Stage 5 in value platform evolution

Context (S5C)

23. Market response

a. Consumer feedback of technical issues to improve telematics technology

- *"During the process of providing telematics insurance services to our customers, our Business Section chiefs and Business Section managers gathered the feedback reported by our salespeople, financial channels, and direct customers regarding issues of using the telematics device, the telematics application. Afterwards, the feedback was summarised and reported to the Personal Lines Department at Headquarters so that it [the user experience of Insurer T's telematics insurance] could be improved." (T6-NP)*
- *"Customers sometimes called us [Insurer T] to complain about the operation of telematics application… or to report the issues they encountered while using the telematics application… these kinds of issues had to be dealt with immediately… as we sought to modify and improve the application."* (T1-1, T1-NP)
- *"Since a customer of mine had been using our telematics application, one day he called and checked with me whether the application was under maintenance as he could not access it. Afterwards, I checked with colleagues, and it was confirmed… Then I suggested that it would be clear if customers could be informed about the time it would be under maintenance by using a banner to overwrite the frontpage of the application." (T10-1)*
- *"As our telematics insurance services were being provided to customers, our salespeople constantly reported feedback from customers regarding the steps where they found it not user-friendly." (T5-2)*

b. Low adoption rate of telematics insurance

- *"It has been four years since the launch of the very first telematics insurance in the market. Nevertheless, telematics insurance policies account for merely one per cent in Taiwan at the moment… Only a small number of customers have switched to adopting telematics insurance." (Online news article: 7. Dec. 2020)*
- *"There are only a limited number of people in Taiwan who are insured with telematics insurance. Some insurance companies admitted that they have issued less than 10 policies a month. In addition, most people think that their personal positioning information will be leaked. … And some companies have suspended the sale of telematics insurance." (Online news article: 7. Dec. 2020)*
- *"It turned out that current telematics insurance was not effective in Taiwan… No matter whether customers can get premium discount or not, they had to share their data with insurance companies and record their driving behaviour for a certain period of time [three months] in advance. As a result [sales performance] did not look great; it just shows that people did not like this idea." (G3)*

24. Entry of new entrants with various techniques

a. The emergence of various techniques to analyse driving behaviour

- *"There are four types of telematics insurance being provided in the market. Insurer T uses the risk factors of driving distance, driving behaviour, time of driving. Insurer G adopts the risk factors of driving distance and time of driving. Another top insurance company applies the risk factor of driving distance, while the other insurance company adopted the risk factors of driving distance and the thickness of brake pads." (Online news article: 22. Jan. 2019)*
- *"Additionally, Regulator acknowledged that the direction of developing telematics insurance [other new types of telematics techniques] seems to head towards a different direction to what it [Regulator] had expected." (G2-1)*
- *"Some [insurance companies] utilised telematics insurance to give inappropriate discounts to their customers." (C1)*

– *"Although telematics insurance seemed effective in the beginning, customers got confused by other types of telematics insurance that were being launched into the market." (T4-CIT)*

b. Potential inappropriate telematics insurance in the market

– *"There was a situation in which certain types of telematics insurance seemed to cause a price war among insurance companies in the market which prompted FSC to intervene." (ONA)*

– *"Although some insurance companies began introducing their telematics insurance one after another, telematics insurance did not seem to become popular in Taiwan." (Online news article: 24. Jan. 2019)*

– *"In July last year, some techniques of telematics insurance were recognised as triggering price wars… And the sales of telematics insurance is not as good as expected; some insurance companies have not even issued any telematics insurance policies after the launch, and some even have stopped issuing their telematics insurance policies. Therefore, FSC and NIA finally came up with a clearer direction after six months of re-examining the risk factors of telematics insurance." (Online magazine article: 15. Jan. 2020)*

– *T1 drew an arrow to show the process of development and identified four critical incidents. The last incident was labelled as 'Regulator intervention' and T1 said, "Other insurance companies can only adopt our telematics technique if they paid us because of the protection of our patent. It was impossible that they would pay us for the technique. Hence, they developed their own techniques, and some of the risk factors turned out to violate insurance principles." (T1-CIT)*

Mechanism (S5M)

25. Evaluating the delivered value of telematics insurance

a. Identification of controversial telematics techniques in the sector

– *"Why did insurance companies use it [telematics insurance] to compete with insurance premiums?… In the end, it just looked like all insurance companies were using telematics insurance to trigger price wars [from Regulator's perspective]." (R1)*

– *"Regulator recognised telematics insurance was causing premium price wars since certain insurance companies attracted customers by offering [unreasonable] premium discounts through telematics insurance. Regulator believed that such a situation wasn't in consonance with its original purpose based on the regulator's viewpoint. Consequently, the regulator started containing [telematics insurance] by checking whether telematics insurance should be discontinued or terminated. And it became a bit difficult for both sides [insurance companies and Regulator] to cooperate." (G2-1)*

– *"At the moment, Regulator has recognised that telematics insurance is causing a price war. It would not let insurance companies issue new policies until they come up with reasonable explanations." (M1-1)*

– *"As more and more insurance companies have launched their telematics insurance, Regulator began realising that the telematics techniques were in disorder." (TC)*

– *"Regulator noticed that the telematics techniques of some insurance companies did not implement the concept of big data analysis… Therefore, it began recognising the inappropriateness of certain types of telematics insurance." (T10-1)*

– *"Now that Regulator has requested the re-examination of telematics insurance… Some insurance companies had developed their own telematics techniques which did not use appropriate risk factors to collect driving behaviour." (T1-CIT)*

– *"Some insurance companies proposed certain techniques of monitoring driving behaviour which seemed reasonable in the early stage of reviewing… Nevertheless, how the quality of its telematics insurance services was managed and controlled by insurance companies was questioned. These insurance companies failed to provide concrete evidence and data to eliminate concerns*

from Regulator. Hence, Regulator started recognising that telematics insurance was causing a pricing war." (T1-1)

b. Evaluate the premium income of telematics insurance and the number of issued telematics insurance policies

- *"We were expecting that a lot of people would download our telematics application… Despite the expectation of achieving a certain amount of sales number, it turned out that the exact sales number did not meet our expectation." (T1-1)*
- *"When we [Insurer T] are promoting a new product, we would monitor how many policies have been issued and the actual revenue the product has generated." (T8)*
- *"In the later stage, performance evaluation meetings were held once every two weeks or a month. In the meeting, the sales number of telematics insurance was presented, and the marketing strategies were adjusted accordingly. It turned out that those free telematics devices have never been entirely given away for several months." (T3-2)*
- *"During the period of selling telematics insurance, customers did not seem to accept the idea of telematics insurance… Although we had around three or four hundred individuals who registered to use our telematics application… These hundreds of individuals should have insured their cars [after using the application]. However, it turned out that only two telematics insurance policies were issued [namely only two individuals had insured their cars with Insurer G]… This indicated that customers felt that telematics insurance was not necessary for them. Hence, they just stuck to traditional motor insurance rather than switching to telematics insurance." (G2-2)*

c. Adjust strategies by constant monitoring the performance

- *"Our strategies of selling telematics insurance varied based on market reaction and market demands. If the market keeps demanding it, then we would keep offering it. Nevertheless, if the market did not show much interest or acceptance, then we [Insurer T] would adjust our strategies." (T1-1)*
- *"We [Insurer G] monitored customer adoption rate. When customer adoption turned out to be low, then we would not add more investment [to enhance services]. We just used only a few risk factors [rather than investing heavily right in the beginning]." (G2-1)*
- *"As we were promoting our telematics insurance [as a pilot round], we realised a low adoption rate of telematics insurance in the market… Therefore, we did not want to further develop telematics insurance and we did not invest much resource in it." (G3)*

d. Identification of vulnerability through financial examinations

- *"In the development of financial technology, improving applications is a key point that you have to keep meeting customers' demands. When it is about modifying applications, insurance companies are strictly managed by FSC. Since our [Insurer T's] telematics insurance was well-known in the sector, FSC first examined our telematics insurance during financial examination… It checked how our systems and Tech C's systems were integrated and the content of the non-disclosure agreement… From FSC's perspective, it examined the security level of Tech C's databases when there is data transmitting between us [Insurer T] and Tech C." (T1-CIT)*
- *The role of Financial Examination Bureau as a subordinate agency of FSC is stated as "Planning and implementing the supervision and examination of financial institutions." (OR)*
- *"FSC conducts regular financial examinations every two years. It examined our telematics insurance very strictly this time… It spent the entire five working days examining our IT Department, and this is unprecedented. We received a lot of opinions and suggestions that compelled us to improve, otherwise, we may receive sanctions or be forced to terminate the sale." (T3-1)*

e. Improve the design of telematics technology

– *"When we received feedback from customers regarding the telematics application, we informed Tech W about the issues… once the modification from Tech W's side required us to update to a new version, then we had to re-test it again."* (T3-NP)
– *"A new type of insurance would be developed by headquarters and be disseminated to salespeople… Then salespeople would report feedback to the headquarters to make further improvements. This is how innovation works, through cross-department collaboration." (T6-2)*
– *"Telematics devices were distributed to salespeople so that we could gather feedback [for improvement] as these devices were being used." (T7-1)*
– *"When customers [who were users of Insurer T's telematics insurance] reported certain issues to us… If it was a technical issue, then we could check the issue with the IT Department and Tech C and ask them to improve it together." (T1-NP)*
– *"One day a senior executive raised the issue of data backup. The Personal Lines Dept. did not think about the mechanism of data backup at that time while collaborating with Tech W. However, we [IT Department] had very limited human resources and we did not understand the structure and techniques of the telematics application. Additionally, we cooperated with Tech W by preparing the hardware and software requested by Tech W. Hence, we could not intervene such a situation. Afterwards, we discussed the issue of data backup with Tech W. Of course, the backups must be stored in Insurer T rather than in Tech W. Eventually, we coordinated with Tech W and solved the issue by figuring out a solution, which is acceptable by us and easy to implement for Tech W." (T3-CIT)*

f. Seek to improve the design of telematics technology

– *"Although Tech M sought to improve its telematics techniques… the sales number of our telematics insurance gave us a reason [Insurer G] to let Tech M know that we decided to terminate it." (G3)*
– *"We [Tech M] shared our achievement of adding several driving factors for telematics technology and suggested Insurer G improve the design of its telematics insurance by adopting those new factors." (M1-2)*

26. Interpellation by legislators about promoting telematics insurance

– *"A legislator pointed out that no insurance companies had launched any new types of telematics insurance since June despite FSC aiming to encourage the development of telematics insurance in the FinTech Development Promotion Program in October 2016. The regulator questioned FSC for terminating all types of telematics insurance even if they were previously approved." (Online news article: 7. Nov. 2020)*
– *"During an interview, the legislator emphasised that FSC has earned recognition for providing telematics insurance services… However, it is also anticipated that FSC should move with the times… The legislator indicated that FSC is currently facing a difficult problem that it has to not only protect customers but ensure no insurance companies employ telematics insurance to trigger price wars." (Online news article: 7. Nov. 2020)*
– *"There was a legislator who interpellated FSC about the progress of developing telematics insurance, therefore, Regulator required all insurance companies to re-submit their telematics insurance." (Summarised from T2-2)*

Outcome (S5O)

27. Adjust the strategies of service innovation

a. Establishment of new rules

"As technologies are advancing rapidly, there is a trend that it is always technologies that come into play first which makes Regulator realise that current regulations are not suitable for managing insurance technology. Therefore, Regulator always establishes regulations by trying to catch up with changes of technologies… Nowadays, insurance companies, which launched new types of insurance related to insurance technology, are just catering to government policies. It was because Regulator established new rules to manage

insurance technology since some insurance companies were using telematics insurance for premium price wars. Now with the increase of rules in regulations, most insurance companies become passive in developing insurance technology." (C1)

– *"In the official document sent from Regulator, it announced a re-examination of telematics insurance to call for modifying the design of telematics insurance. As existing telematics insurance is provided as insurance riders, Regulator required all insurance companies to design telematics insurance as a primary cover." (T10-2)*
– *Although our previous telematics insurance is currently terminated due to the announcement from Regulator, we are still working on developing another new type of telematics insurance because Regulator is still hoping that an authentic telematics insurance could be developed. What Regulator meant by authentic telematics insurance is the use of a wide range of driving behaviour risk factors such as hard braking and accelerating [since previous telematics insurance only adopted a few driving behaviour risk factors]. (G2-2)*

b. Suspend existing telematics insurance for re-examination

– *"Since insurance companies adopted different telematics techniques for their telematics insurance, now Regulator has temporarily suspended the sale of telematics insurance." (T10-1)*
– *"Now Regulator organised meetings with us [Insurer T] and [members of] NIA [other insurance companies] to examine telematics insurance." (T2-1)*
– *"Now that Regulator has acknowledged telematics insurance is causing a price war, it has sent an official document to stop approving new types of telematics insurance and requires all insurance companies to explain the design of their telematics insurance." (M1-1)*
– *Regulator sent an official document to suspend the sale of telematics insurance in the market. It requested all insurance companies to modify their telematics insurance based on the rules it had created for telematics insurance before re-submitting their telematics insurance. (G2-1)*

c. Reduce investment and resources

– *"In the beginning, Tech C anticipated that it would expand its business in the insurance sector, so it was willing to provide us some free telematics devices… However, it turned out that it [the sales number of telematics insurance] was not as expected… And now it is not in contact with us anymore [Insurer T]." (T3-1)*
– *"Regulator is now planning to establish new regulations… so that means more obstacles for insurance companies to develop telematics insurance. And this discourages most insurance companies from further investing in the development of telematics insurance." (C1)*
– *"In the later stage, we did not actively promote telematics insurance since now Regulator is re-examining telematics insurance… Even our telematics insurance is legitimate; however, we [Insurer T] are a key target [since it has issued most of the telematics insurance policies in the market]. We are still offering telematics insurance services to our existing customers. Nonetheless, we would not invest that much in it anymore." (T8)*
– *"Now that the new rule was established for telematics insurance… Since we [Insurer T] have not modified the design of our telematics insurance policy accordingly, we are just providing telematics services as renewals." (T7-2)*
– *Insurer T stopped working on advancing the value of telematics insurance and issuing telematics insurance policies. Insurer T started focusing on improving then shifted its strategy of promoting telematics insurance to maintain current customers (T3-2, T6-2, and T9-2)*
– *Insurer T started focusing on improving the design of its telematics insurance to maintain current customers. (T9-1, T10-2, T5-2)*

d. Termination of Insurer G's telematics insurance services

– *"Since consumers did not seem to accept telematics insurance… and Regulator recognised that insurance companies were heading towards a direction which*

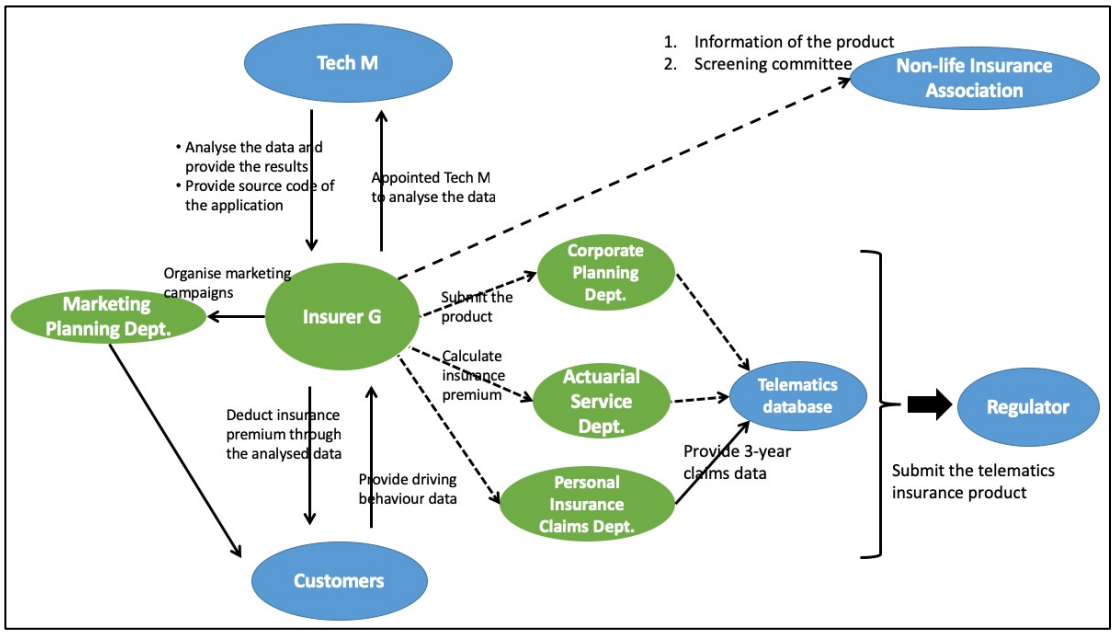
was not as it had expected… Therefore, we had to terminate the sale of telematics insurance." (G2-1)

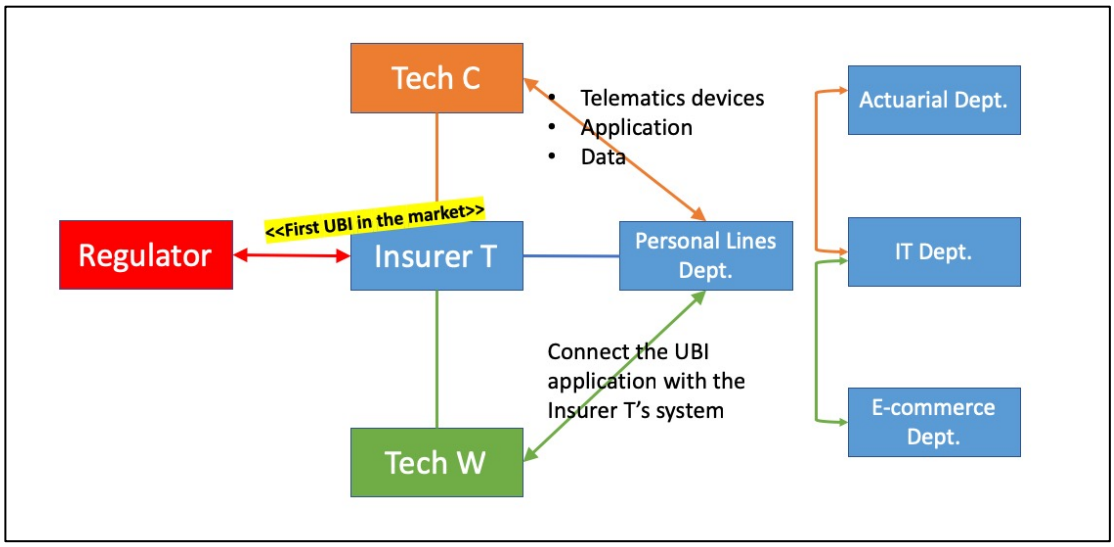
- *"We utilised the development of telematics insurance as a pilot round which conformed to Regulator's direction… As we collaborated with Tech M… but the sales number of our telematics insurance gave us a reason to let Tech M know that we decided to terminate it… And now since we terminated telematics insurance, Tech M no longer offers services in relation to telematics insurance to us." (G3)*
- *"Now that Regulator recognised that telematics insurance is causing price wars… Many insurance companies stopped offering telematics insurance services because they believed they could not change Regulator's perception of telematics insurance triggering premium price wars. One of the insurance companies also terminated their collaboration relationship with us." (M1-1)*
- *Tech M had to suspend and postpone only collaborations with Insurer G and Insurer G only issued two telematics insurance policies. (G2-2)*

e. Switch to target customers in other sectors

- *"From my observation, Tech C shifted from actively to passively interacting with us [Insurer T]. Tech C began selling its telematics technology to fleet management and motor manufacturing industries." (T3-1, T3-2)*
- *"Tech C managed to further collaborate with organisations in the motor manufacturing industry and the fleet management industry since they have obtained some data and developed more ideas [around telematics technology]." (T2-2)*
- *"Since the insurance companies all stopped issuing telematics insurance policies, we moved on to applying for a grant to collect driving data for several car fleets." (M1-2)*

Appendix 7. Evidence of network pictures





Appendix 8. Evidence of critical incident techniques