The Cooperation Problem in the Establishment of a Common Service Platform for Elderly Care
An Application of Collective Action and Institutional Entrepreneurship

MASTER THESIS

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Dedicated to the loving memory of my dear father

谨以此纪念我亲爱的父亲
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CHAPTER 1 INTRODUCTION

Smart Home, or the automation of home and household activity, has been believed to be the home of future. It makes the operation of home apparatus much easier, more flexible and comfortable by enabling control at a certain range of distance, time and magnitude. After decades of gradual development, this domain is recently experiencing a rapid growth, owing to the booming technologies. Not only our home and household activities are becoming more automatic, but many other aspects of our daily living, such as communication, entertainment, health care and fitness, etc., are also becoming more convenient. In response to this trend, a new vision for our future living with more emphasis on wireless and intelligence has been brought up, depicting a home-based but not home-bounded daily living automation which provides the needed services at the right time and right ‘amount’ regardless of the users’ location, and most importantly, with easy operation. To differentiate this vision from simple home-automation, the term ‘Smart Living’ is coined as a replacement for ‘Smart Home’ (Nikayin, Skournetou et al. 2011). As the global ageing problem exacerbates, Smart Living is promising to solve the problem of lacking resources for elderly care. Nevertheless, its realization in the field of elderly care can be challenging due to the cooperation problem among the various stakeholders.

In this research we will tackle several aspects of the cooperation problem that can potentially be encountered by the Smart Living projects in elderly care via a thorough review on relevant literature and a case study on an in-home assisted living project in Finland.

1.1 RESEARCH BACKGROUND

The last decade witnessed a boom of new technologies and concepts such as sensor technology, mobile technology, cloud computing and internet of things, etc. As a consequence, various innovative products and services have sprung up, especially the soaring number of advanced gadgets such as fitness tracker, motion detecting devices, automatic door, car control, automatic audio system and lighting control, just to name a few. The core components of these products are sensor-based data collectors or actuators, and in some cases both. In order to function, they need to be connected to an intermediary to deliver the utilities to the users. The intermediary is called a platform, defined as "system of technologies that combine core components with complementary products and services usually made by a variety of firms" (Annabelle Gawer 2007, Gawer 2009). It typically consists of "hardware, network, an operating system or a software framework" (Fatemeh Nikayin 2011). Such platforms can be laptops, smart phones, or more domain-specific ones like smart TVs, game consoles, and home-automation platforms, etc.

Considering that these devices function via different platforms and they connect to these platforms via different communication protocols and technologies, the overall architecture can be very complicated and inconvenient to use as the number of devices increases. Besides, the large number of user interfaces also add to the inconvenience. Therefore the integration of these platforms becomes necessary in order to keep the operation simple for the users. More importantly, integration also provides the solution to realize the vision of Smart Living as it increases the compatibility and interoperability of the devices and services, which are the crucial foundations for achieving intelligence.

1 Examples of these smart devices are Nest Lab’s thermostat, Sonos, Philips’ Hue, and Fitbit, etc.
2 Examples of these platforms include Crestron’s home-automation control systems, Control4’s automation controllers, Revolv Hub, and Nest Labs Thermostat etc.
AN INTRODUCTION TO THE RESEARCH PROBLEM

Scholars propose a type of integrated platform called a common service platform (CSP) to realize such integration. It is defined as ‘a collection of shared functionalities and technologies to offer smart living services’ (Nikayin, Skournetou et al. 2011), or a platform delivering services from multiple vendors across sectors to customers.

Nowadays, numerous examples of CSPs built for our daily living scenarios can be found in the field of smart living. Most of these platforms are established by home automation integrators such as Crestron, AMX and Control 4. Generally speaking, these platforms exhibit considerable compatibility and interoperability. First, each platform contains a broad array of complementary devices and services, both from in-house and third parties across various sectors such as home security, energy control, and entertainment. Second, although currently there are numerous mainstream communicating technologies and protocols such as Wi-Fi, Bluetooth, Z-wave and ZigBee, etc., most platforms support several of them in order to increase their connectivity. Moreover, most of these platforms, if not all, provide application programming interface (API) or software development kit (SDK) to public for module and driver development in order to connect and interoperate third-party devices, and for application development to provide services with all these devices in various ways. In addition, as more and more services are provided from the cloud, where large amount of data and other resources are pooled together, these CSPs can attain more intelligence. While these CSPs require professionals in integration and installation, plug-and-play smart living solutions are as well emerging in the market. Especially as the rapid growth in information and communication technologies (ICT) and mobile technology has provided more secure and stable wireless communicating technologies to substitute cabling and wiring in traditional home automation, easy-to-use smart living solutions such as Revolv’s home automation hub, and Google’s ongoing project ‘works with Nest’, are starting to appear in the market.

Besides the examples above, Smart Living solutions for elderly care are also showing great potentials in coping with the global ageing problem today. Yet the platforms in this field, contrary to common service platforms, focus merely on their own niche and support mainly in-house devices and services. CSPs are yet to be established in order to reach the full potential of smart living in dealing this societal problem. Nevertheless, establishing a CSP for elderly care can be considerably challenging.

The practical problem of establishing a CSP for elderly care will be discussed in detail in chapter 2, thus in this chapter only a summary of the practical problem is presented. The problem is twofold: one aspect of the problem is related to the attributes of the CSP itself, and another is related to the business model associated with a CSP. First, network effect is the key attribute of platforms, and it poses a start-up problem to the establishment of a CSP, i.e., all the vendors and other potential users might be reluctant to be the first ones joining the CSP and this can render the platform a failure. Moreover, the establishment of a CSP means introducing a new business and service model for elderly care, it might invoke resistance to changes in the field, which can also be a challenge. Besides, in the field of elderly care, it might require more cooperation from various actors to accomplish the basic development of the platform and to integrate their devices and services. Depending on the project, more actors such as government and nursing homes may be involved. Considering the diversity of these actors' backgrounds, interests and resources, it can be difficult to facilitate the cooperation.

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3 For example, Crestron Connect. Cloud computing enables the shift of local service to the cloud so that all the data collected will be processed in the cloud and needed service will be offered from the cloud for the user. It enables better central processing ability.
1.2 THEORETICAL RELEVANCE

Four streams of literature are applied in this research to tackle the practical problem of establishing CSPs for elderly care. First, the start-up problem with respect to establish a CSP can be characterized as a collective action problem, in which individuals have to act collectively to achieve a common goal while the decision of each individual to act cooperatively or not is highly dependent on their expectation on others’ actions. Thus collective action theory is studied to tackle the problem. Second, we study a stream of literature on institutional entrepreneurship which discusses the implementation of institutional changes in order to provide an insight to the enabling conditions for overcoming resistance to the establishment of a CSP, which imposes a business and service model divergent from the ones actors in the field have been using. Third, platform theory is applied as it sheds light upon the object of this study—the attributes of platforms. Last, we also study the literature on Institutional Analysis and Development (IAD) framework. IAD framework can be deemed as a basic foundation for integrating and comparing various theories and analysis, and a meta-theoretical language in which those theories and analysis are discussed (Ostrom 2009). Among these theories, collective action and institutional theory are the core ones, therefore we apply this framework in this study. We use IAD framework as a tool to combine the three streams of literature mentioned above in order to have a holistic view on the different points of focus and the relations among the concepts from the literature.

1.3 RESEARCH OBJECTIVE AND RESEARCH QUESTIONS

The objective of this research is twofold - to contribute to the theoretical field as well as to help resolve the practical problem in Smart Living field. The objective can be elaborated as follows:

a) To broaden the application of collective action and institutional entrepreneurship by combining the two streams of theories with platform theory;

b) To contribute to Smart Living field by: 1) providing a perspective for viewing the cooperation problem in the establishment of Common Service Platform (CSP); and 2) providing a practical suggestion on how to facilitate cooperation in a platform provision project.

The following research question and its sub-questions are coined accordingly to achieve the objective:

What are the key factors that can be leveraged to facilitate cooperation for the establishment of a CSP in Smart Living domain and how do they influence cooperation?

a) What are the roles of literature on collective action and that on institutional entrepreneurship in comprehending the cooperation problem in establishing a CSP in Smart Living domain?

b) According to the literature, what are the key factors that can be leveraged to facilitate cooperation in a given CSP provision project and how do they influence the cooperation?

c) How do the key factors influence the cooperation in the empirical case of Smart Living CSP provision?

1.4 RESEARCH APPROACH
In this study, we will answer the research questions with a literature review and a single case study. Specifically, the literature review will answer research question **a)** and **b)**, and the case study will answer the question **c)**.

We consider literature review as an important research step, due to the necessity to integrate the three distinctive theories to this study, i.e., collective action, institutional entrepreneurship, and platform theory. Although large amount of literature exists on the three theories respectively, the amount of literature combining all of them is too limited, if not none, for us to derive propositions directly to guide the case study. As the three streams of literature are very different from each other in terms of focuses and ways of problem framing, extensive work is required in order to properly combine and apply them in this study. To aid the literature review, IAD framework is adopted in this study. Introduction on IAD framework and further explanation is presented in subsection 3.1.1.

The method case study is used to address the propositions created in the literature review. We adopt this method because of the explorative nature of this study and the contemporary real-life context of Smart Living projects, the condition under which case study method is recommended (Yin 2008). In specific, for the empirical study we need to explore how the cooperation in providing a CSP for elderly care can be influenced by the key factors identified in the literature review, for which detailed information is needed to provide insights into the context of the specific project, and thus case study is the appropriate method because it enables the collection of richer data or more detailed information. Moreover, factors in collective action and institutional entrepreneurship usually concern networks among the actors, and the information can be too intricate to obtain via other research methods.

**Research Steps**

The general steps of this research are presented in Figure 1.1. In chapter 2, a brief introduction of the Smart Living in elderly care will be presented to shed some light upon the background of the case study and the research problem will be elaborated. In chapter 3, we will firstly conduct a study on the four streams of literature mentioned above, and explore the factors which can facilitate the cooperation; based on this, we will then take a practical approach to draw propositions for the case study, i.e., we will focus on the factor(s) which can be easily leveraged by platform providers or project leaders who wish to facilitate cooperation. This chapter should answer the sub-question **a)** and **b)** mentioned in section 1.3. In chapter 4, the case study protocol and the results of the case study will be given, and this should provide the answer to sub-question **c)**. Lastly, in chapter 5, the main findings, discussion, contribution and limitation of this study will be presented, and recommendations for practitioners and future researches will be made.
FIGURE 1.1 THE RESEARCH STEPS
In chapter 1, we have introduced the Common Service Platform (CSP) as the solution to realize Smart Living vision. In this chapter, we will provide an insight into the challenges of establishing CSPs in Smart Living for elderly care. Section 2.1 will introduce the current application and future trend of smart living solutions in elderly care. Section 2.2 will elaborate the potential hurdles in establishing a CSP in elderly care domain.

2.1 SMART LIVING IN ELDERLY CARE

Global ageing is one of the greatest challenges facing the world today. In 2013, the global population aged 65 and over takes up approximately 8% of the total population. The elderly dependency ratio, i.e., the ratio between the population of age 65 and over and the population of working age (16~64), is 12%, suggesting that every 100 working age people have to burden the living of 12 elderly. These numbers are still increasing rapidly (www.worldbank.org 2014). As the ageing problem imposes significant financial pressure on both governments and families, many countries are trying to reinforce the welfare system, for instance, by improving access to healthcare and insurance coverage (Topol 2012). However, improvement of the welfare system is just a redistribution of resources, and the fundamental issue lies in the lack of resources such as labor force, health care and nursing facilities (Nazerfard, Rashidi et al. 2011). Therefore, more radical change is needed to provide cost-efficient and labor-saving elderly care.

Smart living solutions for elderly care exhibit the potential to deliver such a radical change. With a focus on in-home living, these solutions increase the efficiency of elderly care in two ways. The first is to alleviate the problem of lacking nursing facilities and labor force by aiding independent living of the elderly people and improving their life quality. The second way is to save the costs of health care by enabling early detection and prevention of diseases as well as customization of healthcare (Topol 2012). Many devices have already existed in the market to accomplish these functionalities, for example, devices such as smart crutch and medicine which help the elderly complete daily living activities (Kautz 2003), and devices like activity monitor and vital sign monitor which enable timely first-aid treatment, etc. (Nazerfard, Rashidi et al. 2011).

2.1.1 FUTURE POTENTIALS OF SMART LIVING SOLUTIONS FOR ELDERLY CARE

Notwithstanding the development of devices, for Smart Living to provide real cost-efficient and labor-saving elderly care, it is crucial to utilize the vast amount of data generated by various devices. For instance, the data can be used to provide context-aware services for aiding independent living (Tao, Zhanqing et al. 2009). More accurate information on the status of the elderly and the environment can be derived by analyzing the shared pool of data generated by different devices, and accordingly intelligent services can be provided to the elderly by utilizing this information. Besides, the data can be used to predict and even prevent diseases. Since there are various devices collecting data regularly, hidden health hazards can be more easily detected by looking into the pattern of data. Moreover, the treatment or care procedures can be
customized for different individuals according to their different situations. This can increase efficacy of treatments while at the same time save costs for the society (Topol 2012).

The hurdles in enabling the future vision

The recent development of cloud computing has largely increased the potentials of Smart Living for elderly care by enabling easy access to tremendous data storage, maintenance and processing ability. Nonetheless, some issues are yet to be tackled before the data can be used to provide intelligent solutions such as context-aware services and disease prediction, etc. In specific, various standards are used in the data from different devices, much efforts are needed to convert them so that the data can be compatible to be analyzed together. Moreover, as many of the devices and services across platforms are not interoperable, it is difficult to deliver context-aware services.

2.2 CHALLENGES OF ESTABLISHING CSP FOR ELDERLY CARE

In chapter 1, we have mentioned that using common service platforms can solve these problems concerning compatibility and interoperability discussed in the end of last section. Nonetheless, lots of challenges can be encountered to establish CSPs in the field of elderly care.

To start with, common service platforms, the same as any other platforms, are subject to network effect. The value of a platform not only depends on its intrinsic features such as functionalities and design, but also on the user installed base, and the availability of complementary goods or the content on it, such as devices and services (Schilling 2010). This means that the more the platform is adopted by users and complementors (i.e., the providers of complementary goods (Gawer 2000), the more it is going to be adopted by them. This is called an increasing return or self-growth mechanism (Arthur 1989, C Shapiro 1999). On the other hand, this mechanism also poses a threshold of adoption for the platform to be further adopted, i.e., the critical mass constraint. This then translates into a dilemmatic start-up problem—if there are not sufficient number of adoptions already, the platform cannot attract any further adoptions, thus the sufficient number of adoptions cannot be attained. In chapter 3, we will present a more detailed explanation on the mechanism of network effect and the associated start-up problem.

In the case of providing a common service platform, multiple devices and services should be available according to the definition of common service platforms, and this also enables the platform to have the momentum to grow. Thus one of the most important tasks of establishing a common service platform is to reach the threshold of devices and services. This then is subject to the start-up problem discussed in last paragraph. This start-up problem translates into the following question in the case of providing a common service platform— how to achieve the minimum number of devices and services on a platform when there are not this minimum number of devices and services already? From a platform provider’s point of view, there are two types of strategies. The first is to integrate proprietary devices and services by developing them in-house, outsourcing the development, or acquiring existing solutions. The second kind of strategies is to reward the early adopters by, for example, subsidizing them, offering free access to the platform, or other benefits, etc. (Gawer and Cusumano 2002, Eisenmann 2006). Since it is rare that the platform providers in elderly care or even broader healthcare field are able to provide sufficient proprietary devices and services on the platforms, they need to instead use the second type of strategies in order to gain cooperation from the vendors.

Then from the perspective of a potential cooperator, whether to join to develop a platform or not simply depends on how they assign benefits and costs to the rewards offered by the platform.
provider and the platform itself. However, considering there is a substantial risk that the benefits associated with the success of the platform might not be reaped as the provision of a platform can fail more easily compared to joining a platform with at least a minimum level of adoption, the actors might not be willing to cooperate.

Moreover, the start-up problem is exacerbated due to the high costs of joining to develop a common service platform for elderly care. The application of smart living technologies in elderly care is different from the smart living for average daily living scenarios. In elderly care field, with the well-being and lives of the elderly people at stake, the services need to be more professional. As a result, more accuracy is required for the devices in generating data, sector-specific expertise is needed to provide the right services, and efforts are needed to ensure the functions are well-aligned. Besides, as we mentioned in the beginning of this section, there is an incompatibility issue due to the different formats, structure and semantics of the data, as well as an issue of poor interoperability among the devices and services. These problems also need to be fixed. These requirements not only further increase the costs and risks for the actors to join the platform, but also pose a difficulty of coordination since the close cooperation among these actors are needed and potential conflicts might emerge owing to their different backgrounds and interests, etc.

Besides the start-up problem due to the high risks and costs, there is also the problem of unwillingness to adopt a common service platform. According to Garud (2002), “no technology exists in a vacuum. Each requires a defined institutional space with rules that govern the production, distribution, and consumption of associated artifacts.” The establishment of a CSP is also associated with the creation of an institutional space around it. That is, it imposes a new business and service model that the actors in smart living field provide their services via a shared platform containing generic technical and operational functions. It can introduce vast changes to the business of the device and service vendors as well as other stakeholders. Hence, there could be challenges like resistance to the new concept and difficulties in aligning the actors’ current business models with it.

2.3 CONCLUSION

In conclusion, this chapter has introduced the background of this study and elaborated the practical problem by looking into the current status and future trends of Smart Living solution for elderly care. The practical problem of this study can be summarized as follows.

**Practical Problem:**

Using common service platforms can improve Smart Living solutions for elderly care by solving the issues of compatibility and interoperability facing the field nowadays, however the provision of common service platforms can encounter two major challenges. **First**, the actors’ risk of suffering a loss by joining a CSP development project is quite high, due to the difficulty in solving the dilemma of starting up posed by the critical mass constraint. Thus they might be reluctant to join the CSP provision, especially that the potential loss can be substantial because the actors need to invest much effort and resources, owing to the high requirement for the Smart Living solutions in the field of elderly care. Therefore, the first challenge is solving the start-up problem. **Second**, the provision of a common service platform imposes a very different model of doing business and providing services from the prevailing models in the field. Since the actors might be reluctant to change the ways of doing business which they are used to, they might not be interested in the provision of a common service platform in the first place. Therefore, the second challenge is gaining the support among the actors.
CHAPTER 3 LITERATURE REVIEW

In chapter 1, I have briefly discussed the theoretical relevance: there are four streams of literature applied in this study—collective action, platform theory, institutional entrepreneurship, and IAD framework. In this chapter, I will conduct a detailed literature review on these four fields and establish a conceptual model. In section 3.1, a respective review on each stream will be carried out. In section 3.2, the interrelationship of the key concepts from literature will be specified, which will provide an embryo of the conceptual model. In section 3.3, a finalized conceptual model will be derived by making assumptions and propositions on concepts and their relations according to the interest of this study.

3.1 LITERATURE REVIEW

3.1.1 IAD FRAMEWORK

Institutional Analysis and Development (IAD) framework was developed by Elinor Ostrom and other researchers from the Workshop in Political Theory and Policy Analysis at Indiana University (Anderies 2004, Ostrom 2005, Ostrom 2009). The initial idea behind generating this framework is to create a universal approach for scholars across fields to integrate, understand and compare their researches on human interactions, and eventually enable better knowledge accumulation.

IAD framework provides a complete set of interconnected and nested variables that defines 1) the context where human interactions embedded, 2) interactive action situations which depict human interactions, and 3) the outcome of these interactive action situations and its feedback on the context and action situations. These interconnected variables not only provide a common meta-theoretical language to talk about concepts from different theories, but also provide an analytical tool to structure the interpretation of one certain empirical problem concerning human interactions and their outcomes. In other words, IAD framework serves as an intermediary between different theories, models, and empirical problems because it provides a standard language to discuss them.

Before further elaboration of the IAD framework, it makes sense to explain what is meant by a framework. There are differences among the notions of framework, theory, and model. According to Ostrom (2011), a framework is at the broadest level of theoretical analysis, comparing to a theory and then, at the most specific level, a model. It can be used for comparison and evaluation of theories with respect to a phenomenon. The variables from the three levels are nested and interconnected. Usually several theories are compatible with one framework, the choice for certain theories in a research depend on the research focus. Likewise, multiple models can be generated from one theory, depending on the condition of interest, to test a specific set of parameters.

THE REASON FOR USING IAD FRAMEWORK IN THIS STUDY

In this study, three theories are adopted to help us understand the cooperation in a platform provision project. Among them, collective action and institutional entrepreneurship provide two different perspectives to look at the cooperation, while platform theory sheds light upon the object of this study. Since collective action, and institutional theories which the topic institutional entrepreneurship pertains to, are among the mostly applied theories in IAD
framework (Ostrom 2005), we naturally came up with the idea of using IAD framework in this study.

These three theories have very different focuses and ways of problem framing, thus applying them appropriately to the same empirical case can be challenging. Using IAD framework can aid this process in the following ways. First, since IAD framework provides a complete set of interconnected variables, we can locate the concepts from each theory and their interrelations in IAD framework, thus the three theories can be compared and integrated in this study. Second, IAD framework helps us identify the different ways of problem framing in the theories, hence we can be more aware of the conditions under which the theories can be applied. Third, the empirical case can also be analyzed in the common meta-theoretical language of IAD framework, thus the case study can be more structured and better aligned with the theories.

THE COMPONENTS

The IAD framework consists of seven general parts (see Figure 3.1): 1, biophysical conditions; 2, attributes of community; 3, rules-in-use; 4, action situations; 5, interactions; 6, outcomes; and 7, evaluative criteria. Each part can then be further decomposed into more specific variables. McGinnis (2011) gives a metaphorical explanation of this framework: the action situations can be viewed as a ‘black box’ that transforms the inputs (i.e. external variables such as biophysical conditions, attributes of community, and rules-in-use) into outcomes that provide feedback on the external variables and directly on the action situations themselves. The process of generating outcomes and the outcome itself can be evaluated by actors using specific sets of criteria and thus be influenced.

The external variables—biophysical conditions, attributes of community, and rules-in-use, respectively describe the physical, social and institutional context of an action situation. More specifically, the biophysical condition refers to all the characteristics concerning the goods such as resources and products which are to be allocated, consumed or provided, as well as the characteristics of the means that can be used to allocate, consume and provide these goods. For example, the characteristics of goods can be the size of natural resources and their degree of renewability; they can also be the attributes associated with the excludability and subtractability of the goods. And the characteristics of the means could refer to the speed limit of using certain technology to exploit the natural resources, and the physical possibilities people can use to cope with goods with different level of excludability and subtractability. In other words, Biophysical condition means all the characteristics of the physical world that action situations take place and act upon. Attributes of community refer to the social and cultural aspects of the context. This includes everything that describes the subject in a research, e.g. 1) the values, norms, and the size of the group; 2) the composition of a group or the social and economic status of the actors;

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<th>Subtractability of use</th>
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<td>Difficulty of excluding potential beneficiaries</td>
<td>High</td>
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4 The criteria usually refer to (i) economic efficiency, (ii) equity through fiscal equivalence, (iii) redistributional equity, (iv) accountability, (v) conformance to values of local actors, and (vi) sustainability, see Schilling, M. A. (2010). Strategic management of technological innovation. Boston, McGraw-Hill/Irwin.

3) heterogeneity or homogeneity of resources and interests, trust, and reciprocity among the actors. Finally, rules-in-use refer to the enforced prescriptions on both means and ends of any action which are understood by and shared among the actors (Ostrom 2005).

The core component in this framework is the ‘black box’—i.e. the action situation. The action situation can be seen as ‘social spaces where individuals interact, exchange goods and services, solve problems, dominate one another, or fight’ (Ostrom 2011). The structure of an action situation is similar to that of a game. It depicts ‘participants in positions who must decide among diverse actions in light of the information they possess about how actions are linked to potential outcomes and the costs and benefits assigned to actions and outcomes’ (Ostrom, Gardner et al. 1994) (see Figure 3.2). However, an action situation is more complex than a game because its structure is influenced by the context where it is embedded and by the outcome of other action situations. Most importantly, it can also influence the context and other action situations.

**External Variables**

Figure 2.1 IAD Framework  
*Source: (Ostrom 2005)*

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**ANALYZING ACTION SITUATIONS**

An action situation can be identified when ‘two or more individuals are faced with a set of potential actions that jointly produce outcomes’ (Ostrom 2005). An action situation serves as the smallest unit of institutional analysis. It is similar to a game defined in game theory, but it is embedded in a complex context⁶. In this research, we will use this as the unit of analysis. The elaboration on action situation will be in section 2.1.

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The internal structure of an action situation—represented by the eight working parts in Figure 3.2—is shaped by exogenous factors\(^7\) including external variables and other action situations. The eight working parts, as shown in Figure 2.2, include the seven items in bold and the action-outcome linkage marked as 'linked to' in the center of the figure. According to Ostrom (2005), these eight working parts and the ninth variable—the repeating time of this action situation—compose the necessary and sufficient condition to predict the outcome of this action situation.

There are four ways of analyzing a problem or phenomenon by using IAD. The analysis starts with identifying a focal action situation and its structure, and it finishes with predicting or analyzing the behavior of actors involved in this situation. In game theory, the exogenous influence is usually assumed to be constant or ignored to simplify the analysis. This way of analysis is referred to as defining a formal game. This would be sufficient when the structure of the focal action situation is rigid and simple\(^8\), for instance in chess playing game, a perfect competing market, the Prisoner's Dilemma and its variants. However when the structure of the action situation is highly flexible and dynamic due to the changing context where it is embedded, additional steps are required for the analysis to take into consideration the influence from external variables and the interaction with other action situations. These influences will affect one or more working parts of the focal action situation as displayed in Figure 3.2 and ultimately change the outcome\(^9\). For these more complex situations, there are generally three applicable methods (Ostrom 2005). First, Case study can be used to explore and understand the influence from both external variables and other action situations; Second, modeling complex chain of action situations or networks of action situations\(^10\) can be adopted to structure the analysis when the influence from other action situations are especially of interest to the research (McGinnis 2011); Additionally, agent-based modeling can also be adopted to aid the

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\(^7\) Besides, the repeating times of an action situation – whether the interaction will occur once, a known and finite number of times, or indefinitely- should also be taken into consideration since it affects the strategies taken by participants.

\(^8\) Although for 'simple' games, for instance chess playing, the large number of possibilities is still beyond calculable using any super computer at this moment of time, it is a simple game in terms of structure as it can be solved by reductionist method.

\(^9\) To extend the 'black box' metaphor, each action situation is like an integrated chip which receives influence from the external world and other action situations with the seven 'pins'(the seven working parts), and influence others with its outcome.

\(^10\) According to Elinor Ostrom, E. (2005). Understanding Institutional Diversity. Princeton, NJ, Princeton University Press., 'One strategy is to represent key parts of complex chains of action situations as a game without trying to represent the entire structure as one game'.
understanding or even make tentative predictions by modeling the interactions among the actors. In this research the method case study is used to address the influence of the external variables on the specific action situation defined in the case.

By far, we have introduced IAD framework as a meta-theoretical analytical tool and explained why we adopt it. In this study, we will use IAD framework, 1) to aid the literature review by integrating the different concepts and their interrelations from each theory, as well as by clarifying the conditions under which it is applicable, and 2) to aid the case study by providing a schema of data coding.

3.1.2 COLLECTIVE ACTION

The reason that collective action is adopted in this study is that the dilemmatic start-up problem discussed in chapter 2 with respect to establish a CSP can be characterized as a collective action problem discussed in collective action theory, and studying the literature can help us comprehend the problem and provide an insight into the ways of tackling it. A collective action problem refers to the cooperation problem associated with a social dilemma, in which individuals have to act collectively to achieve a common goal that benefits everyone, but if the individuals choose to maximize short-term self-interest everyone will be worse off than they could be (Ostrom 1998). In this study, the start-up problem of establishing a CSP is such a collective action problem, multiple actors need to cooperate to succeed in providing a CSP, but if they all choose to dodge the risks in the beginning and wait for the CSP to gain sufficient adoptions before they join it, the CSP can never be provided. Next, the results of literature review on collective action will be presented.

The term ‘collective action’ is broadly used in research fields such as sociology, psychology, political science, and economics. Research topics under this term range from simple decisions by individuals whether to collaborate-or-not to complex interactions of actors in multiple scenarios. In this study, collective action refers to the cooperation among a group of actors to realize their common interests under a circumstance when there is “a potential conflict between the common interest and each individual’s interest” (Ostrom 1998, Ostrom 2010) which posed a dilemmatic situation in which ”the maximization of short-term self-interest yields outcomes leaving all participants worse off than feasible alternatives” (Ostrom, Ostrom et al. 2014). More specifically, this study is about collaborations when the biophysical conditions posed such dilemmatic circumstances. The problem how to achieve collaboration in such situations will be referred to as collective action problem. Drawing from the definition in 2.1.1, biophysical conditions are the characteristics of the physical world where these collaborations take place and act upon. In many cases, biophysical conditions are simplified into two dimensions—level of excludability and subtractability (Ostrom 2009). And dilemmas are usually associated with low excludability, in other words, with situations where the common interest of a group is or concern public goods and common pool resources11. In some situations, the common interest of a group can be seen as a public good once which is provided, its benefits cannot be excluded from any group member whether he or she has contributed to provide the good or not.


<table>
<thead>
<tr>
<th>Subtractability of use</th>
<th>High</th>
<th>Common-pool resources</th>
<th>Public goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty of excluding potential beneficiaries(non-excludability)</td>
<td>High</td>
<td>Low</td>
<td>Private goods</td>
</tr>
</tbody>
</table>
Therefore, free-riding is tempting for the group members (Olson 1971). In some other situations, common-pool resources are involved, then the common interest of a group would be that everyone harvests in a sustainable way, because common-pool resources have, besides low excludability, high subtractability. This means if one harvests more, there would be the same amount less for the others. But since the low excludability means that it is difficult to prevent people from harvesting, then everybody is tempted to overharvest (Hardin 1971).

Early works (Hardin 1971, Olson 1971) generally predict that these dilemmas cannot be solved by the actors themselves who are involved in the dilemmas, but only by enforced rules which are imposed externally. However this view is challenged by our daily living experiences that spontaneous collective action is actually common. For instance, irrigation systems voluntarily provided by local communities and self-organized institutions among fishers, etc. can be found all over the world. Thus, many subsequent researches point out that the problem of those early works lies in the restrict assumptions underlying their collective action models. After all, most would agree that a group of isolated, rational, selfish and short-term interest oriented individuals will not contribute to communal benefits which conflict with their own short-term interests in a perfectly competitive environment. It is the generalization that is problematic. The outcome of a collective action is contingent, the attributes of contexts and individuals can vary from situation to situation, and the behavior of individuals also depend on these attributes.

After the contingent nature of collective action was ‘exposed’ to the world, over thirty variables had been identified as influential for collective action (Ostrom 2005), for instance, variables concerning 1) the actors, including their information about the situation, their resources, intrinsic values, and their characteristics like sympathy, guilt, and quasi-magical thinking (Dixit and Nalebuff 2008), etc.; 2) community conditions like the group size, heterogeneity of the group members, social network, trust and norms of reciprocity, etc.; 3) the rule configuration used to constrain the group members’ behaviors; and 4) biophysical condition that are involved such as their excludability, subtractability and production function, etc.

Although all these factors can influence the success of collective action, we will merely focus on a small part of them, as the goal of this study is to find out the factors that can be leveraged by the platform providers or project leaders to facilitate cooperation. Therefore, in the following content we adopt the social capital approach of collective action (Ostrom and Ahn 2007) to narrow down the factors.

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SOCIAL CAPITAL APPROACH OF COLLECTIVE ACTION

The Reason for Using the Concept of Social Capital in This Study

Generally speaking, the term social capital refers to a group of factors which, 1) are associated with social structure, and 2) can provide advantages for the actors within the social structure in achieving a certain end (Coleman 1988). The main reason that we adopt the social capital approach of collective action is that it provides an access to learning about factors that can be actively leveraged by actors to facilitate cooperation, for social capital can be deemed as a type of resources which actors can mobilize to help realize certain ends. Admittedly, besides social capital, many other factors can also be leveraged, including other forms of capital like human or economic capital, etc. However some of these factors are predetermined and less easy to acquire than social capital, and we are also more interested in studying social capital. For the reasons above, we focus on social capital in this study.

The Definition of Social Capital
The notion of social capital first came into being in 1988 by Coleman (1988), who defines social capital as a function of social structure which facilitate "certain actions of individuals who are within the structure." Just like other forms of capital, it is a set of assets capable of generating future benefits for at least some individuals (Lachmann 1956). Social capital includes factors related to the beneficial attributes of the structure, such as density and strength of ties, norms, and trust (Putnam, Leonardi et al. 1994), as well as factors related to the social positions of some actors in a social structure that generates benefits for these actors (Leca, Battilana et al. 2008). While collective action theories mainly focus mainly on the attributes of the social structure, literatures on institutional entrepreneurship also emphasize the importance of actors’ social position. In this subsection, we will first look into the attributes of social structure and leave the elaboration on social position in subsection 2.1.4.

Social Capital in Collective Action

Social capital in collective action theories, i.e., the attributes of social structure, can be deemed as the attributes of individuals and of their relationships that enhance their ability to solve collective-action problems (Ostrom and Ahn 2007). Three types of social capital are considered of particular importance for collective action—trustworthiness, networks, and institutions. And the key these three types of social capital enhance individuals’ ability to solve collective action is by enhancing the level of trust among them. Here, trust means one actor’s subjective belief or anticipation about another actor’s particular behavior which is unobservable or not-yet-observed (Ostrom and Ahn 2007). Increased level of trust can motivate actors to behave in favor of mutual benefits instead of behaving opportunistically or exploiting others for private benefits.

Among the three forms of social capital, networks and institutions work via changing actors’ incentives, that is, their payoff structure. Networks as a form of social capital include dense ties and norm of reciprocity. Networks can motivate even a completely selfish and rational individual to cooperate and the reasons are threefold. First of all, in dense or closed networks, various norms restricting actors’ behaviors are usually adopted to foster cooperation. Next, actors in a network observe and gossip about who behaves according to the norms and who does not. And the observation and the transmission of information provide a natural and powerful monitoring system for executing these norms. Last, in dense networks, actors usually adopt reciprocity norm. If a defector is observed and exposed in the network, the further exchanges between this defector and other actors within (or even outside of) the network will be in jeopardy. In the future, other actors may refuse to exchange with a defector. Therefore, actors need to balance the gains from opportunistic behaviors and the losses from damage of reputation which leads to the loss of potential gains from further interactions. Similarly, institutions could also motivate actors to cooperate. Institution or rule configuration, defined as “any structure or mechanism of social order and cooperation governing the behavior of a set of individuals within a given human community” (Berger 1966) or “human - constructed constraints or opportunities within which individual choices take place and which shape the consequences of their choices.” (Ostrom 2005, McGinnis 2011). Rules and norms are both “prescriptions that an action or outcome in a situation must, must not, or may be permitted”(Ostrom 2005), the difference is that rules are coercive as they impose institutionally assigned consequences, i.e., enforced sanctioning or rewarding, for breaking or obeying the rules (Crawford and Ostrom 1995).

Trustworthiness, on the other hand, works differently. It is the objective probability that one actor would trust others and behave cooperatively (Yamagishi 2001), in other words, trustworthiness is one actor’s intrinsic preference to trust and to cooperate. For instance, if an actor is asked to invest and join a business by a complete stranger under the condition that no any sort of contract will be made, the likelihood of this actor to trust and to cooperate with this
stranger represent the degree of trustworthiness of this actor. It can be seen as an ordinal variable, with the total trustworthiness referring to behaving cooperatively in the absolute absence of other cooperation-enhancing social capital (Ostrom and Ahn 2007), and total non-trustworthiness to acting selfishly and rationally on material incentives. Apparently, by definition higher trustworthiness will increase the level of trust in any network and facilitate collective action. Since the object of this study is to provide a tentative suggestion to the platform providers on how they can facilitate the cooperation, we will exclude trustworthiness as an important factor in this study as it is not for the platform providers to control.

In this study, the social capital approach of collective action can be seen as a shortcut to narrow down the vast number of factors influencing collective action to those that can be leveraged by actors to facilitate cooperation. After looking into the relevant literature, we arrive at three influential factors—networks, institutions, and trustworthiness, and we screen out trustworthiness because it is too vague for this study and difficult to leverage.

3.1.3 PLATFORM THEORY

In subsection 3.1.2, we mentioned that a collective action problem refers to a cooperation problem associated with a social dilemma. While most of the social dilemmas discussed in collective action literature concern public goods and common-pool resources\textsuperscript{12}, the dilemma in this study concerns platforms. The term “platform” is wildly used in literature on management, economics and ICT, etc., its definition also varies from domain to domain. In this thesis, since the common service platform we study is a technology platform, we adopt the definition that it is a “system of technologies that combine core components with complementary products and services usually made by a variety of firms” (Annabelle Gaver 2007, Gaver 2009). The dilemma associated with such a platform is fundamentally a start-up problem due to the network effect, which we have briefly discussed in chapter 2 as the practical problem. In this subsection, we will delve into this start-up problem by providing an explanation on the mechanism of network effect and an elaboration on the network effect of technology platforms.

Mechanism of Network Effect

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure3_3.png}
\caption{ACCELERATING PRODUCTION FUNCTION SOURCE: (OLIVER, MARWELL ET AL. 1985)}
\end{figure}

\textsuperscript{12} See footnote 11.
As we mentioned earlier, the dilemma or start-up problem of providing a platform is due to network externality or network effect. It means the new adoptions of users will enhance the value of the platform, i.e., it produces a positive externality on other adopters, this will attract more adopters. Thus, more users there are on a platform, the more valuable it becomes, hence more users will join. Although the self-increasing mechanism of platform is attractive, it sometimes poses a critical mass constraint. This critical mass is a threshold to ignite the self-increasing mechanism. This is well captured by Oliver’s discussion on start-up problem in collective actions with accelerating production function\(^{13}\) (Oliver, Marwell et al. 1985). A production function is the function relating input of resources to the changes in level of achievement of the common goal, in other words, it denotes how input from actors generates returns. In her paper, an accelerating production function is defined as the probability that a dichotomous common goal (i.e., it could either be achieved or not achieved, but it cannot be partially achieved) would be provided \(P(r)\), given the units of resources that have been contributed \(r\) (Figure 3.3). Then the first individual’s decision to contribute or not can be made according to the following equation\(^{14}\):

\[
N(r) = VP(r) - kr
\]

\(N(r)\): net payoff from a contribution of \(r\)
\(V\): an individual’s value or interest in the common goal, constant.
\(k\): the cost of contributing a unit of resource, constant

Now if we take the derivative of this function, we get:

\[
N'(r) = VP'(r) - k
\]

And when \(P'(r) = k/V\), \(N(r)\) reaches a minimum. The equation starts at zero, and the minimum is thus below zero, which means the initial contributions for a collective action with an accelerating production function actually generate loss. And it is not hard to imagine after the minimum point has been reached, it still takes a bit more contribution before the payoff starts being positive.

**Network effect in technology platforms**

For a platform which is itself a functional product, such as a TV, a network router, or a car, etc., its intrinsic value is independent from adoptions and is associated with its usability and design. We can think of a constant term adding to \(N(R)\) in the equation mentioned above, the net payoff to a user can thus be secured by the intrinsic value. That is to say, the network effect does not necessarily pose a critical mass constraint, but the vendors can make use of the mechanism to further increase the adoption. Various strategies and tactics to utilize the network effect can be found in the literature, such as, improving the product or service itself (Suarez and Cusumano 2009), using pricing strategy or other means to encourage or reward adoption (Eisenmann 2006), stimulating word-of-mouth advertisements by early adopters (Evans 2009), as well as increasing its compatibility with existing products (Gawer and Cusumano 2002, Schilling 2010). However, if the intrinsic value of a platform is comparatively low, if not completely zero, and highly dependent on complementary products or a specific group of users, to resolve the critical mass constraint is crucial to its survival and it requires more proactive strategies. These are the cases where there is a critical mass constraint. Examples of such platforms include a microprocessor whose value is dependent on the other components of a computing device; a

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\(^{13}\) There might also be a top-out or saturation, but it is out of the scope of this study.

\(^{14}\) The original setting is if it is a single actor, here we change it into a first actor to simplify it.
social network site whose value is dependent on the users on it; or a dating venue, whose value is not only dependent on the number of users but also dependent on the number of users of both genders.

Most likely, platforms exhibit a two-sided, or even a multi-sided market, that is, platforms are usually intermediaries between two or more groups of users. This feature of a platform can be as obvious as in the case of a dating venue, that is, there is one market respectively for men and women; or it could be more subtle as for the microprocessors and operating systems, where there is one market for consumers and another for complementors. Sometimes, in less obvious cases, the feature of two- or multi-sided market can be defined according to the roles customers play in different usages, for instance, in social network sites or telephone networks which usually are seemed as one-sided, at least two markets can be identified such as the markets respectively for content sharers and viewers, and for telephone callers and callees (Evans 2009).

Consequently, platforms with such two- or multi-sided feature exerts an indirect network effect that an increase of usage or demands on each side stimulates that on the other sides (Rochet and Tirole 2003, Armstrong 2006, Evans, Hagiu et al. 2006), in addition to the direct network effect. The associated critical mass constraint then means the platform can only be valuable for users from one side if there are enough users on the other one(s). Therefore, to ensure the survival of a platform, there are more decisions that need to be made than choosing the strategies to attract users on each side, for example, if the users from different sides should enter sequentially or simultaneously, and if pre-commitments should be made to one side or more sides of users, etc. The answers to these questions depend on the nature of network effect, that is, how the number of users on one side influences that on the other. Evans (2009) provides a comprehensive analysis on how to decide the sequence of different actors entering the platform. Since this falls out of the research scope, further elaboration will not be made in this study.

Following subsection 3.1.2, where we review the literature on collective action and identify the factors helping solve collective action problems, which the start-up problem is part of. This subsection serves as an in-depth explanation on start-up problem, one of the challenges facing platform provision as discussed in chapter 2. We have explained how network effect causes this problem and provided some examples of technology platforms with network effect. This should offer a clearer understanding of the start-up problem.

3.1.4 INSTITUTIONAL ENTREPRENEURSHIP

Besides the start-up problem, we also mentioned another challenge facing the platform provision in chapter 2. The introduction of a CSP for elderly care is associated with the introduction of a new business model in the domain, and various changes might occur to the actors whose cooperation is needed to establish the CSP. The actors might have resistance to changing the way of doing business which they are used to and hence are not willing to cooperate. This problem embodies the difficulty of implementing institutional changes discussed in the literature of institutional entrepreneurship, i.e., actors take the current way of thinking and acting for granted and they thus resist to changes which break with the status quo. Therefore, we will review the literature on institutional entrepreneurship to understand this problem and learn how to tackle it.

Last subsection has shed some light on the attributes of platforms, which are the biophysical conditions in the projects this study wishes to analyze. On top of that, we have to note that the provision of a technological platform is not merely about the platform itself. It is also about the rules denoting how it can be used. Naturally, when providing a platform there should be corresponding rules about how this platform can be allocated, provided or consumed. According
to Garud (2002), “no technology exists in a vacuum. Each requires a defined institutional space with rules that govern the production, distribution, and consumption of associated artifacts.” Thus, besides the technology itself, the providers will also try to shape the institutional space around it in a way which favors their interests most. In the case of platforms, providers can reap significant benefits of increasing returns by implementing the right rules. The strategies and tactics mentioned in last subsection give a glimpse of the how-to guide for crafting rules. However, implementing the rules is not easy, especially when persuading the complementors to join and coordinating them to work around a platform. Concerning the changes the technology and its corresponding rules can bring in the future, these actors may doubt about the platform providers’ intention or they may worry about the potential conflicts that could appear (Garud 2002). The platform providers therefore need to actively mobilize resources and exert their skills to gain support and acceptance from others (Garud 2002, Leca, Battilana et al. 2008). This subsection will look into how the level of structural closure in an actor’s network, defined as the extent to which the actor’s contacts are connected with each other, can enable him or her to mobilize resources and exert skills by reviewing literatures on institutional entrepreneurship.

DEFINITION OF INSTITUTIONAL ENTREPRENEURSHIP

There are various forms of entrepreneurship such as conventional entrepreneurship, institutional entrepreneurship and social entrepreneurship, etc. Fundamentally, the core of any sort of entrepreneurship can be described by the following dialogical relation: “individual ⇔ new value creation” (Bruyat and Julien 2001). The differences among them lie in many aspects. For example, the mission of an entrepreneurial activity can be for-profit or non-profit. While the mission of conventional entrepreneurship is always for-profit, it is not so rigid for other types of entrepreneurship. Then, the form of value created by different entrepreneurial activities can be different. It can be a new product, a new method or a new meaning, etc. Moreover, the distribution of the value created can also differ. It can be distributed to shareholders, stakeholders, or the public, etc. (Dacin, Dacin et al. 2010).

Since the purpose of adopting institutional entrepreneurship for this study is to provide a perspective to look at the empirical case, there is no need to differentiate institutional entrepreneurship from other forms of entrepreneurship to a detailed extent. Thus institutional entrepreneurship will be defined merely by the form of new value creation, that is, the new institutional arrangements. Institutional arrangement means the practices and structures of a field (Hwang and Powell 2005), such as a role division model among professionals (Battilana 2006, Battilana 2007), managerial practices (Boxenbaum and Battilana 2005, Battilana, Leca et al. 2009), promotional practice (Sherer and Lee 2002, Battilana, Leca et al. 2009), or a business model (Battilana, Leca et al. 2009, Tracey, Phillips et al. 2011), etc. This process of changing or creating new institutional arrangements are commonly referred to as institutional change (Hwang and Powell 2005). In this study, Institutional entrepreneurship thus can be defined as a process that the “initiatives of actors with interest in particular institutional arrangements to shape institutions as they emerge or transforming existing ones by leveraging resources” (Selznick 1957, DiMaggio 1988, Fligstein 1997, Garud 2002). Following the dialogical relation, the individuals who initiate and implement institutional changes are the institutional entrepreneurs (Battilana, Leca et al. 2009).

SOCIAL CAPITAL IN IMPLEMENTING INSTITUTIONAL CHANGE

Realizing the value is not easy for the institutional entrepreneurs, and many factors can influence the process. In this subsection, we will again adopt social capital approach to filter the
factors which can be actively leveraged, for the same reasons we use social capital approach when reviewing collective action.

Institutional changes often encounters resistance among the actors who are used to, especially those who benefit from, the current institutional arrangement (Leca, Battilana et al. 2008). Even when a change will bring benefits to everyone, the actors may still have doubts about the institutional entrepreneurs’ intention or they may worry about other potential risks. Thus it is a challenge to get supports for change initiations (Leca, Battilana et al. 2008). Many studies have explored the factors influencing the likelihood of success in getting supports for change initiations. These factors range from individual level conditions such as personality, access to resources, social and political skills, to field-level ones such as jolts, crisis and the level of institutionalization of the field, etc. (Leca, Battilana et al. 2008). As we aim at providing tentative recommendations for the practitioners and field-level factors are difficult to change, we will stay on the individual level and look at how one of the structural factors—the level of structural closure in a network—influence the likelihood of getting supports for the change initiation.

The common individual level conditions—actors’ knowledge about the field, their access to resources, their social and political skills to get and maintain support for their change projects (DiMaggio 1988, Fligstein 1997, Garud 2002, Battilana 2004)—can be enabled by their social positions in, and the attributes of, the networks they are engaged in. While social position influences an actor’s perception of the fields as well as their access to resources (Lawrence 1999, Dorado 2005), the characteristics of the network decide the level of trust and opportunities, etc. existing in the network which the actors can exert their skills to mobilize for gaining or maintaining support for the institutional change. According to the definition in 2.1.2, these beneficial attributes of networks and the actors’ social positions in the networks can be considered as social capital. Therefore, this study will review some literature on the effect of social capital on institutional changes.

Social Capital in Change Implementation

Different from the social capital approach of collective action theory, in which several forms of social capitals are studied, the field of institutional entrepreneurship mainly looks at how actors’ networks as a form of social capital facilitate change implementation. Specifically, the networks here refer to both the social positions of actors and the structure of the networks themselves.

An actor’s social position refers to the actor’s status in a network. Generally speaking, an actor can be located at different positions in a network, ranging from the edge or periphery to the center. For change initiators, there is a well-established positive effect of being central in the networks on their success of change implementation (Battilana and Casciaro 2013). This is because the actors located in the center are well connected with and trusted by the other actors in the network, and also have the access to right resources.

While being central is a clear advantage for change initiators to implement changes, controversial opinions exist on the effect of the structure of networks. Two different opinions exist on what kind of network structure is more favorable. One opinion favors a closed interconnected network, or a network with high level of structural closure. A closed network is a network with trust, and people are generally believed to be more likely to share information as well as non-information resources with people they trust, thus a closed network enables better coordination (Fleming, Mingo et al. 2007). Another opinion favors more open networks, i.e., networks with lots of structural holes. A structural hole is a relationship of non-redundancy between two actors—if two actors are neither directly connected nor indirectly connected by sharing the same direct contacts, the relationship between these two can be identified as a structural hole (Burt 1992). A network with lots of structural holes provide the project initiator
with the opportunities for brokerage, which means coordinating between people who are separated by structural holes. The opportunities for brokerage give the project initiator information and control benefits (Burt 1992). Information benefits refer to that since disconnected contacts are not likely to share the same knowledge, source of information, norms and meanings, individuals who bridge them are more likely to access to novel and non-redundant information. Information benefits enable actors bridging structural holes more likely to detect opportunities and to have high creativity. The control benefits, on the other hand, means the freedom of strategic coordination across the holes. For instance, one can decide who of these contacts to involve in certain projects and when to involve, and one can also decide to introduce one contact to another when necessary. Moreover, if one’s contacts are not connected with each other, then he or she can strategically decide when and how to present information differently according to their interests and preferences, with little risk of potential confrontation from the contacts due to information inconsistency. In the following content, a resolution to this controversy will be reviewed.

The Divergence of Change Initiation

Battilana proposed that whether structural closure or structural holes are favorable for change implementation depends on the level of divergence of the change. A divergent change is more likely to arouse resistance among stakeholders, and under this condition a closed network, due to its ease of mobilizing people and resources, is more likely to induce coalition among actors against the change initiation. On the contrary, a network with structural holes have less probability to induce such coalition and moreover, project initiator can tailor the change propositions to different constituencies according to their specific interests and preferences, thus increase the likelihood of the success of change implementation. When the change is non-divergent, the problem of resistance is of less concern, thus the brokerage benefits of structural holes are not as crucial as in the case of high divergence. Under this circumstance, a closed network is more preferable as it can benefit the change implementation in two ways—firstly, the ease of mobilizing people will enable actors to persuade others who have not yet agreed on the change initiation; and secondly, cooperation is easier to coordinate in a closed network since, 1) the high level of trust in a closed network can increase the willingness of actors to share information and resources; and 2) the redundant and repetitive relationship in a closed network can facilitate and accelerate the sharing of information and resources.

In this subsection, we use social capital approach again to narrow down the factors influencing cooperation for change implementation. Two main factors are identified as crucial for fostering cooperation—social position and networks (including the two opposite forms—networks with high level of structural closure and networks rich in structural holes). In the next section, we will summarize the key factors we have identified in section 3.1 and choose several factors we are interested in for the case study.

3.2 A SUMMARY OF THE KEY CONCEPTS

After the separated reviews on several streams of literature, this section provides a summary of the key concepts. Subsection 3.2.1 focuses on the concepts in collective action theory and institutional entrepreneurship, including the concept of cooperation and the key factors that can be leveraged to facilitate cooperation. In subsection 3.2.2, we summarize the key factors from IAD framework and their relation to the concepts from the other streams of literature.
3.2.1 THE KEY FACTOR INFLUENCING COOPERATION

Cooperation

In this study, literatures on collective action and institutional entrepreneurship provide two different perspectives to look at the cooperation in establishing a common service platform. Fundamentally, collective action theory focuses on dilemmatic cooperative problems where individual’s short-term interests clash with the common interests of the group and it discusses how these problems can be solved from within the group; while the field of institutional entrepreneurship mainly discusses how actors overcome inertia or resistance to institutional changes in the group when implementing changes. In this study, whether the cooperation is a collective action problem or inertia to changes depends on some specific conditions. These conditions will be discussed in the next section.

Social capital

We use social capital as a filter in this study to help us identify factors which can be leveraged to facilitate cooperation. The concept of social capital can be found in both literatures on collective action theory and on institutional entrepreneurship. Defined as a function of social structure which brings benefits to certain people within the structure (Coleman 1988), social capital is considered as an enabling condition for facilitating cooperation. In the literature, three forms of social capital are identified as important factors for facilitating collective action—networks, institutions and trustworthiness. They facilitate collective action by enhancing the level of trust among actors (Ostrom and Ahn 2007). We rule out the trustworthiness in this study because it is vague thus hard to measure, and also it is predetermined therefore difficult to leverage. In the literature on institutional entrepreneurship, we identified three forms of social capital as the key factors in facilitating cooperation for change implementation—social position, structural closure and structural holes.

Due to the interests of this study, we will solely focus on structural closure (redundancy or density of the networks) and structural holes (non-redundancy or openness of the networks) in the case study. It’s important to note that the factor networks in collective action is essentially structural closure, because the norm of reciprocity, the monitoring from others, or the information transmission about who is trustworthy and who is not, are all features of a closed network. Therefore, we use structural closure to refer to the social capital—networks, in the literature on collective action. The reason we exclude the other two factors—social position and institutions—is that many researches have already studied their effects on cooperation: Institutions or rules provide incentives for the actors to cooperate; and being in the central of a network is advantageous in facilitating cooperation.

The Degree of Structural Closure

15 It is worth noting that the strength of the networks is also a feature of the network structure, but for the following reasons we do not include it in this study. In collective action, both strong ties and weak ties can facilitate the trust among actors as long as the network is closed, hence the strength of ties does not make a difference Ostrom, E. and T.-K. Ahn (2007). The Meaning of Social Capital and its Link to Collective Action. On the other hand, in institutional entrepreneurship, the strength of ties can make a difference in the implementation of organizational change, for instance, having strong ties with actors who have ambivalent opinions towards the change can help convert these actors into supporters Battilana, J. and T. Casciaro (2013). “Overcoming resistance to organizational change: Strong ties and affective cooptation.” Management Science 59(4): 819-836. However, as this study is about establishing a platform in a field, the platform provider can choose the actors who support the idea instead of “fence-sitters” or even resisters, there is no need to list the strength of ties here.
In this study, the attributes of a network whether it contains lots of structural holes or it presents high level of structural closure will be captured by the variable—the degree of structural closure. The two forms of social capital structural holes and structural closure can be seen as the two ends of the continuum representing the degree of structural closure, with the former situation indicating a low degree of structural closure while the latter a high degree of structural closure.

As mentioned earlier, controversial opinions exist on what type of network is better. Next, the two factors and their effects on cooperation will be listed, as well as the factor moderating on these effects.

1) Structural Closure

In a closed network, its members can easily exchange information and other resources thanks to its tightly knitted structure. These actors are hence more likely to share knowledge and meanings. Moreover, cooperative norms are more likely to exist in a closed network than the network rich in holes, since actors’ defection can be more easily detected and made known to others than in an open network (Ostrom and Ahn 2007). Therefore, people and resources can be more easily mobilized in a closed network, and it enables more trust among actors. However, as we mentioned earlier, the ease of mobilizing people and resources is a double-edged sword, since they can not only be mobilized to cooperate but also be mobilized to oppose a project.

2) Structural Holes

Since the actors are not well connected with each other in a network rich in holes, the information exchange among them is less in both frequency and depth. Consequently, there would be more freedom for institutional entrepreneurs to pitch the project strategically—they can tailor and control the information flow as well as the connections among the actors in favor of the project.

Following the summary above, the mechanism how the degree of structural closure influences cooperation can be represented as Figure 3.4.

![Figure 3.4](image-url)
Evidently, the influence of the degree of structural closure on cooperation includes both positive and negative effects, and it is not clear whether a high degree of structural closure (structural closure) is more favorable or a low degree of structural closure (structural holes) is. According to the literature, to solve a collective action problem, trust is the key and a closed network provides more trust than a network with structural holes, thus networks with high level of structural closure are naturally preferred. On the other hand, to implement an institutional change, it is not so straightforward which structure is better, and it depends on a condition—the extent to which the change initiation diverges from the institutional status quo.

**The Divergence of Change Initiation**

The literature suggests that when the potential changes are divergent from the institutional status quo (i.e., the ways of thinking and acting taken for granted by the actors), networks with more structural holes or more open networks are better to facilitate cooperation, whilst when the changes are not divergent, networks with structural closure or more closed networks are better. The reasons are as follows. Divergent changes may cause resistance among the actors, thus a group of well-connected actors are likely to form a coalition against the change initiation. However, if these actors are not well connected, they are less likely to form such a coalition, and there is more freedom to pitch them separately and strategically according to their interests and preferences. On the other hand, non-divergent changes are not likely to induce resistance, hence there is no need for an open network to pitch the actors, besides the high level of trust and the ease of mobilizing people and resources among a group of well-connected actors can facilitate the cooperation.

This interaction effect of the degree of structural closure and divergence of the change initiation on cooperation is shown in Figure 3.5.

<table>
<thead>
<tr>
<th>The Degree of Structural Closure</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>High</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

**Divergence of the Change Initiation**

**FIGURE 3.5 THE EFFECT OF STRUCTURAL CLOSURE ON COOPERATION ADAPTED FROM**

In this subsection, we have summarized the key factors that can be leveraged to facilitate cooperation from the literature and focused on the degree of structural closure which is chosen as the main factor to explore in the case study. In next subsection, the key concepts from IAD which are relevant to this study will be summarized to provide a cohesive view on the literature.

**3.2.2 THE KEY CONCEPTS FROM IAD FRAMEWORK AND THEIR RELATIONS TO THE OTHER STREAMS OF LITERATURE**

In section 3.1, four streams of literature are reviewed. Among them, collective action theory and institutional entrepreneurship are adopted to provide different perspectives for looking at the provision of common service platforms; platform theory is adopted to offer some insights into the attributes of the object of this study—a platform; and lastly, IAD framework is adopted to integrate the three theories above for this study. In this subsection, we will summarize several concepts from IAD framework (Figure 3.1) and use them to classify the concepts from the other three streams of theories.
**Action Situations**

Action situations are defined as ‘social spaces where individuals interact, exchange goods and services, solve problems, dominate one another, or fight’ (Ostrom 2011). As we mentioned earlier, an action situation is similar to a game in game theory. It is defined by eight working parts (Figure 3.2). In this study, collective action and institutional entrepreneurship respectively depict two different types of action situations—collective action problem and inertia to institutional changes. This imposes moderation effect to the effect of structural closure on cooperation. We will elaborate this in section 3.3.

**External Variables**

External variables depict the context of an action situation. There are three types of external variables, biophysical conditions, attributes of community, and rules-in-use, respectively representing the physical, social and institutional context of the action situations. These three clusters of variables conjointly influence the action situations embedded in the context defined by these variables. Most of the factors identified as influential on cooperation in the literature on collective action and institutional entrepreneurship can be seen as external variables. For instance, the social capital, including trustworthiness and structural closure or holes, can be seen as attributes of community; the institutions as social capital can be seen as rules-in-use. Moreover, the attribute of platforms, i.e., network effect, depicted in platform theory can be deemed as the biophysical conditions.

**Biophysical conditions**

Biophysical conditions is one category of the external variables. As defined in the IAD framework, it depicts the properties of the goods and services being allocated, provided, or consumed. Since the object of this study is a platform, the biophysical conditions is a given variable—the properties of platforms. The main property of a platform concerning this study is the network effect, and it influences the action situation by imposing an accelerating production function in the action-outcome linkage.

In this section, we first presented a summary of the key factors that can be leveraged to facilitate cooperation, and we chose the degree of structural closure as the main factor to explore in the case study. Then we present the concepts from IAD framework and how they are related to the other three theories and the concepts from these theories. In the next section, the propositions for case study will be made.

### 3.3 Propositions for Case Study

In last section, the degree of structural closure has been chosen as the main factor to study. Since this factor influences cooperation in different ways (Figure 3.4), whether its effect is positive or negative depends on the conditions. In this section, we examine the different action situations defined by the literature on collective action and institutional entrepreneurship in order to find the conditions and then we accordingly make the propositions for the case study.

The problems addressed by collective action and institutional entrepreneurship can both be generally referred to as cooperative problems, and in each theory several factors are respectively identified as crucial to facilitate cooperation. Nonetheless, the effects of these factors on cooperation can be contingent due to the way cooperative problems are framed in the

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16 See subsection 3.1.1 and 3.2.2 respectively for the definition and relevance of the concept of action situation to this study.
two theories. Fundamental differences exist in the assumptions and problem framing underlying the two theories as one treats the cooperative problem as collective action problem while another as change inertia. In this section, we will explain the key differences underlying the two streams of literature and the way these differences moderate the effects of the key factors identified in last section.

To provide a clear view on the differences, we use the concept of action situation from IAD framework to aid the comparison between the two streams of literature. As mentioned in 3.2.2, the cooperation problems depicted by the two streams of literature can be regarded as two different types of action situations, and the key factor influencing the cooperation—the degree of structural closure—can be seen as an external factor affecting on these action situations.

There are mainly two differences in the action situations defined by collective action and institutional entrepreneurship. The first one concerns the problem framing—collective action mainly frames an action situation where the actors have low level of control over the action-outcome linkage, institutional entrepreneurship frames a situation where the outcomes might be divergent changes which actors show resistance to. The second difference between the action situations depicted by the two theories is the assumptions on the cost and benefits which actors assign to certain outcomes—the underlying assumption for collective action problem is that the actors assign relatively high benefits to costs to the outcomes that maximize their individual interests and mostly material interests, while for institutional entrepreneurship actors assign low benefits to costs to the outcomes that divergent from the current institutional arrangements. Next, the assumptions will be elaborated and followed with the two different ways of framing problems.

### 3.3.1 THE ASSUMPTIONS ON ACTORS

In collective action and institutional entrepreneurship, the actors are portrayed differently. The collective action literatures focus on the rationality of the actors—Actors are usually assumed to be completely rational or boundedly rational according to the interests of the research. Completely rational actors make decisions which maximize their own individual interests based on complete information and perfect analysis. Whereas actors who are boundedly rational are fallible individuals with cognitive limits who cannot always have complete information about the situations they are in but they try to be rational and learn better strategies over time (Ostrom 2005).

On the other hand, in the literatures on institutional entrepreneurship, researches focus more on the extent to which actors are embedded in the institutions they are in. An actor can be as rational as he can by maximizing his own interests, but the interests are not always material as are assumed in many collective action literatures. Actors’ interests and values can also be determined by the institution in which they are embedded, that is, the actors take for granted and prefer the ways of thinking and acting as is determined by this institution. A key topic in institutional entrepreneurship is the paradox of embedded agency. The branch of researches on institutional entrepreneurship was created to explain institutional changes which originated from within the institutions. As the early institutional researches assume actors’ interests and values are determined by the institution, it then leaves institutional changes that originated from inside, which those researches tried to explain, unexplainable. After all, “how can actors change institutions if their actions, intentions and rationality are all conditioned by the very institution they wish to change?”, and this is called the paradox of embedded agency (Garud, Hardy et al. 2007). To resolve the paradox of embedded agency, many studies were conducted to explore the conditions facilitating and enabling institutional entrepreneurship, that is, the conditions which make actors take a skeptical view on the institutions they are embedded in.
Whether the actors are rational and whether the actors are embedded in their institutions are important in indicating the applicability of the two streams of literature. To simplify the study, we assume that: 1) the actors are boundedly rational, as are assumed in many collective action studies (Ostrom 2005, Ostrom 2009); 2) the actors are partially embedded in the institutional arrangements, because on one hand the field of Smart Living is relatively young and thus not likely to be highly institutionalized, but on the other hand there are indeed predominant business models, which can be seemed as a type of institutional arrangements, as opposed to the business model described in a Common Service Platform. Therefore, we make the following assumption:

**Assumption:** the actors are boundedly rational and partially embedded in the institution they are in. To be specific, the actors are fallible individuals with cognitive limits whose interests and values are partially determined by the current institutional arrangements, but they try to be rational.

### 3.3.2 Actors’ Control over the Outcomes

In the literatures on collective action which are based on the assumptions of rational or boundedly rational actors, the collective action problem is deemed fundamentally as a trust problem. Nevertheless, the lack of trust does not always pose problems, it depends on the extent of control each actor has over the linkage of the actions to outcomes. To be more specific, it depends on how dependent each actor is on others in terms of obtaining the pay-offs they want to get from the cooperation, or in other words, on how big a difference each actor can individually make on the result. The control an actor has over a specific outcome can vary from total control to no control (Ostrom 2005). Total control means that the actor can independently determine the status of a specific outcome despite what others do and no control means the actor has no influence on the status of this specific outcome at all. For instance, when the specific outcome is the provision of a platform, if an actor has very low level of control over the status of the provision (say the status can be either successful or failed), it means that his actions could not influence much on the success or failure of the provision. In this study, we define an actor’s level of control over an outcome as the maximum difference in the probability of this outcome that the actor can make (Coleman 1973).

The level of control over the outcomes are determined by the biophysical conditions as well as other variables such as rules and networks. For goods exhibiting externality or non-excludability, such as public goods, common pool resources and in this case, a platform with network effects, etc., they inherently result in low level of control of actors, i.e., no matter the actors contribute or not, each of them cannot make a big difference in the outcome. Whereas the activities concerning private goods enable actors to exert more control, i.e., they will get benefit if and only if they pay for it. Besides the biophysical conditions, other variables can also influence the level of control. For example, rules that are coined to privatize public goods can give more control to the actors, rules and networks imposing rewards and sanctions for certain actions which add selective incentives to actors can also enhance the general level of control for the actors.

Low level of control over the collective goods can be deemed as the main source of collective action problems. As many researches on collective action point out, the main issue underlying collective action is that each actor cannot make a noticeable difference in the final outcome, and the outcome is determined synthetically by the actions of many actors (Olson 1971, Oliver 1993). Since they cannot make a noticeable difference, the better strategy for them is not to contribute or cooperate. This then renders them all worse off. The literature regards this as a trust problem, and social capital can enhance the trust level therefore increase the probability of
cooperation from the actors. We thus propose that if the level of control is lower, then the actors need the social capital more.

According to the literature, structural closure as one form of social capital enhances the level of trust, a network with lower level of it thus is comparatively less likely to provide such trust to actors. In other words, the trust problem due to lack of control is less likely to be solved in a network rich in structural holes. To summarize, we make the following assumption and Figure 3.6 graphically present this effect:

**Proposition 1:** The more control actors have over the interests they wish to realize via the project, the less structural closure in an institutional entrepreneur’s network of contacts increases the likelihood of cooperation.

![Figure 3.6 Interaction effect of structure closure and the level of control on cooperation](image)

**3.3.3 THE DIVERGENCE OF PROJECT INITIATION**

In the literatures on institutional entrepreneurship, as has already been discussed in section 3.1, the fundamental problem is a change inertia. Since actors’ behavior, interests and values are influenced by the institutions which prescribe certain ways of thinking and acting, they might take these ways of thinking and acting for granted. These taken-for-granted ways of thinking and acting are usually referred to as institutional templates, institutional arrangements, dominant templates, or prevailing practices, which embody “widely understood and normatively sanctioned ideas or logic about the ‘appropriate’ means for accomplishing business activities” (Cliff, Jennings et al. 2006). As a result, the projects which might bring divergent changes to the current institutional arrangements are likely to encounter oppositions from these actors who take the current arrangements for granted. In a network with high level of structural closure, the actors are more likely to form a coalition against the project initiation than in a network rich in structural holes, since the resources and people can be more easily mobilized in a closed network. Besides, a network rich in holes can also provide more freedom for the project leader to strategically pitch the actors whose cooperation is needed.

Thus we make the following assumption and Figure 3.7 graphically present this effect:
**Proposition 2:** The more divergent the changes which will be engendered by the project initiation are from the current institutional arrangements, the more structural closure in an institutional entrepreneur's network of contacts diminishes the likelihood of cooperation.

![Diagram of Divergence, Structural Closure, and Cooperation]

**Figure 3.7 Interaction Effect of Structural Closure and the Divergence of Project Initiation on Cooperation**

### 3.4 Conclusion

The main result of this chapter is that we arrive at two propositions about how the degree of structural closure influences cooperation under different circumstances.

In section 3.1, when reviewing the literature on collective action and institutional entrepreneurship, we focus on the articles using the concept of social capital to narrow down the number of influencing factors. In section 3.2, we further narrow down the factors to the **degree of structural closure** because it is less studied in the prior researches and it can be actively leveraged by the actors who wish to facilitate cooperation for platform provision. In section 3.3, we discuss the effect of the degree of structural closure on the likelihood of cooperation. The effect of structural closure is composed of different mechanisms depending on the specific condition—whether the cooperation is confronted with a **collective action problem** or a **change inertia**, respectively framed in collective action theory and institutional entrepreneurship. Then we translate the main features of the two different conditions into the working parts from IAD framework and use them as the moderating variables affecting upon the effect of the degree of structural closure on cooperation. Accordingly, two propositions are formulated. In the next chapter, these propositions will be examined in the case study.
CHAPTER 4 CASE STUDY

— A Secondary Case Analysis on Active Life Home (ALH) Project in Finland

In chapter 3, we developed two propositions on the effects of the degree of structural closure upon the likelihood of cooperation respectively under the moderation of actors’ control over the outcomes and the divergence of project initiation. In this chapter, we will examine whether the propositions are supported by exploring the mechanisms of relationships between the concepts.

4.1 CASE STUDY PROTOCOL

The method case study is used to address the propositions. Case study is a common research method used in social science, and its main strength is that it allows the researchers to inquire into complex social phenomena within a contemporary real-life context via a holistic and in-depth view by relying on multiple sources of evidence including interview, direct observation, and existing documents, etc. (Yin 2008).

We chose the case study method in this study for the following reasons. To start with, considering the contemporary real-life context of the empirical project, case study is an appropriate method. Moreover, this study aims at exploring the mechanism how the degree of structural closure influences cooperation in an empirical project, and this mechanism can be fairly complex as we have indicated in last chapter. Besides, the factor the degree of structural closure concerns networks among the actors, and the information on networks can be too intricate to obtain via other research methods. Therefore, case study is adopted to provide in-depth insights into the course of events and the context so that the complex mechanism can be better comprehended.

4.1.1 UNIT OF ANALYSIS AND UNIT OF OBSERVATION

The literature review on IAD framework in chapter 3 has mentioned that an action situation is the smallest unit of analysis in the framework. In this study, action situations will be adopted as the unit of analysis. An action situation refers to a situation where ‘two or more individuals are faced with a set of potential actions that jointly produce outcomes’ (Ostrom 2005). The scenario in which the decisions are made by the actors to cooperate or not can be considered as an action situation, wherein 1) the changes which might be engendered by the project initiation can be seen as the potential outcomes of the action situation; 2) the level of control is a working part in this action situation; 3) the assumption we made earlier about the characteristics of actors that they are partially rational and partially institutionally embedded can determine the costs and benefits they would assign to the outcomes—the actors may value material payoff as well as the outcomes which keep the institutional status quo. The other working parts will be defined in the cases. Besides the working parts within an action situation, the structural closure, rules-in-use and trustworthiness are external variables affecting the action situation. Since the concept of structural closure concerns the structure of social networks among individuals, the units of observation in this study will be individuals.
4.1.2 CASE SELECTION

This case study is conducted under the PhD research program *Common Platform Dilemmas: Collective Action and the Internet of Things* by Dr. Fatemeh Nikayin (Nikayin 2014), and the cases selected in this thesis were readily arranged.

There are three cases studied in Dr. Nikayin’s research—Active Life Home (ALH) project in Finland, Home-based Senior Care (HBSC) project in China, and West Orange project in the Netherlands. All three cases are suitable for this thesis for the following reasons: 1) the cases are platform development projects, and collaboration among multiple actors is required to develop the platforms, thus each case represents a collective action situation where the biophysical condition defined by the intrinsic property of platforms implies a dilemma, i.e., a situation wherein if no rules specify, actors have very low level of control over the outcomes; 2) the projects are highly innovative and they introduce a business model of technology platform which is divergent to the Smart Living field, thus it is suitable to address the institutional change problem as depicted in institutional entrepreneurship; 3) the companies involved are SMEs with simple internal decision-making process where the top management has a final say, then the collaboration between companies is based on individuals, and this hence provides a proper context for studying how the level of structural closure influences the cooperation.

In this thesis, we focus on the ALH case due to the limitation of time and accessibility of information, i.e., the necessary documents and transcriptions to address the propositions of this study.

4.1.3 DATA COLLECTION

In the PhD research program, the core concepts are related to motivations and networks of actors, and as this is usually not given in the documents, interviews are adopted as the main source of data. Besides, documents provided by informants and from internet are studied to acquire background information as well as to clarify the points which cannot be fully apprehended by interviews. The overviews of interviewees from ALH project are shown in Table 4.1, and the list of documents studied is shown in Table 4.2.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Organization</th>
<th>Date</th>
<th>Job description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olli Nuuttila</td>
<td>Active Life Village Oy</td>
<td>Jan 2012</td>
<td>Managing Director</td>
</tr>
<tr>
<td>Raimo Miettinen</td>
<td>Active Life Village Oy</td>
<td>Jan 2012</td>
<td>Development Manager</td>
</tr>
<tr>
<td>Timo Itälä</td>
<td>Aalto University</td>
<td>Jan 2012</td>
<td>Project Manager</td>
</tr>
<tr>
<td>Matti Hämäläinen</td>
<td>Aalto University</td>
<td>Feb 2012</td>
<td>Professor and Project Initiator</td>
</tr>
<tr>
<td>Petri Vuorimaa</td>
<td>Aalto University</td>
<td>Jan 2012</td>
<td>Professor</td>
</tr>
<tr>
<td>Panu Harmo</td>
<td>Aalto University</td>
<td>Jan 2012</td>
<td>Senior Researcher</td>
</tr>
<tr>
<td>Panu Parviainen</td>
<td>Playground Ltd</td>
<td>Jan 2012</td>
<td>Co-Founder</td>
</tr>
<tr>
<td>Pentti Holopainen</td>
<td>ArctiCare Technologies Oy</td>
<td>Jan 2012</td>
<td>Managing Director</td>
</tr>
<tr>
<td>Mikko Waris</td>
<td>Beddit Ltd</td>
<td>Jan 2012</td>
<td>Chief Technology Officer</td>
</tr>
</tbody>
</table>
### Documents about the background of both cases

<table>
<thead>
<tr>
<th>Number</th>
<th>Name or the Document</th>
<th>Type of the Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ActAge Espoo Pilot 24.10.2011</td>
<td>Presentation slides</td>
</tr>
<tr>
<td>2</td>
<td>ActAge Proposal 1.1</td>
<td>Presentation slides</td>
</tr>
<tr>
<td>3</td>
<td>Active Ageing info</td>
<td>Presentation slides</td>
</tr>
<tr>
<td>4</td>
<td>ActiveAging Initiative Intro Shanghai</td>
<td>Presentation slides</td>
</tr>
<tr>
<td>5</td>
<td>Sino-Finland Aging Forum-Science and Technology on Healthy Ageing</td>
<td>Presentation slides</td>
</tr>
</tbody>
</table>

### Documents related to Active Life Home

<table>
<thead>
<tr>
<th>Number</th>
<th>Name or the Document</th>
<th>Type of the Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Wellbeing technology supporting living at home Case: Active Life Home</td>
<td>Presentation slides</td>
</tr>
<tr>
<td>7</td>
<td>ALH-portal design</td>
<td>Presentation slides</td>
</tr>
<tr>
<td>8</td>
<td>ALH-portal workshop</td>
<td>Presentation slides</td>
</tr>
<tr>
<td>9</td>
<td>Active Life Home: a portal-based home care platform</td>
<td>Academic paper</td>
</tr>
<tr>
<td>10</td>
<td>PCP related initiatives in Finland</td>
<td>Public information</td>
</tr>
<tr>
<td>11</td>
<td>Innovation and public procurement</td>
<td>Company document</td>
</tr>
</tbody>
</table>

### Documents related to Home-based Senior Care

<table>
<thead>
<tr>
<th>Number</th>
<th>Name or the Document</th>
<th>Type of the Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>The New Home-based Senior Care information Service System Based on Technologies of 3G and The Internet of Things</td>
<td>Presentation Slides</td>
</tr>
<tr>
<td>13</td>
<td>Introduction on Wuxin Ltd.</td>
<td>Company document</td>
</tr>
</tbody>
</table>

### Concepts and Interview Questions

The interview questions as shown in Table 4.3 had been coined by Dr. Nikayin (2014) before this thesis project started, and the relations between these questions and the concepts from this thesis are shown in Table 4.4.
### Interview Questions

1. Please tell me about the role of your organization in this project.
2. With what companies are you actually collaborating on a daily basis?
3. What were the main drivers for your company to start collaborating in this project? And what do you consider now as added value of this collaboration for your organization? (e.g., new resources, customers, partners, insights, publicity)
4. Are there any interdependencies between partners in this project? How does it affect your decision for collaboration?
5. In how far were the partners in this project different? How do these differences influence your decision for collaboration? (think of differences in (a) resources (b)sectors (c)size (d) type (private/non-profit/public))
6. Have you encountered any difficulties during the collaboration? How did it resolve (e.g., useful for clarifying different expectations or harmful for project)?
7. Do you provide the technical information of the platform for third-parties to develop services/applications? How and why? Does that influence your decision for collaboration?
8. Is the project open for new parties to join? Are there any rules or agreements for that? How did that influence your decision for collaboration?
9. How the cooperation is coordinated and how did it influence your decision for collaboration?
10. Are there any subsidies or funding available for partners? How did it influence your decision for collaboration?
11. How do you see the future of the service platform in terms of adoption by customers or energy providers?
12. Who is the owner of the platform? Who utilize the platform, who will benefit from it, who will pay for it?

### Table 4.3 Interview Questions Source: (NIKAYIN 2014)

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Definition in this study</th>
<th>Measurement in case study</th>
<th>Related Interview Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Closure</td>
<td>The level to which the contacts of institutional entrepreneur (institutional change initiator and implementer) are connected with each other.</td>
<td>The direct communication and collaboration among the actors besides the institutional entrepreneur.</td>
<td>2,6,9</td>
</tr>
<tr>
<td>Level of control</td>
<td>The extent to which an actor depends on others to obtain pay-offs (e.g., funding, publicity, and insights, etc.) for their cooperation in this project.</td>
<td>The pay-off structure—the combination of biophysical condition of a common service platform and the rules determining how it will be provided and used.</td>
<td>3,4,8,9,10,11,12</td>
</tr>
<tr>
<td>Divergence of change initiation</td>
<td>The extent to which the project break with the institutional template. The extent to which the project will change any</td>
<td>The difference between ALH project and other projects the actors used to be involved and between the concept of</td>
<td>1-12</td>
</tr>
</tbody>
</table>
4.1.4 SECONDARY DATA ANALYSIS

All the interview records were transcribed and, when necessary, translated. Then, the transcriptions and the related documents were read carefully to provide a basic understanding on the background of the cases. Next, the software Atlas.Ti 7.5 was used to analyze all the interview transcripts and documents. We did four rounds of coding.

First, two rounds of open coding was carried out without focusing on the concepts in the propositions. The analysis on the interviews is a secondary case analysis and the transcripts were organized according to the propositions from the PhD research program, hence the contents related to the concepts of this study were scattered. Therefore, we first coded all the explanatory factors open-mindedly and then followed with a round of axial coding to relate the open codes with the concepts in this study. During the axial coding, overlapping codes were merged and codes irrelevant to this study were removed. During both open coding and axial coding, several network views, i.e., the maps depicting interrelationships of the codes, were constructed, and the unclear points and some conjectures were written in the memo. Then, we went through the transcription and documents to check if there is any omission on the explanatory factors or improper coding, as well as to search for the answers or confirmations for the questions or conjectures in the memo. For the unclear points, we found some documents from the internet and carried out the fourth round of coding on these documents. In this round, several network views were edited and some new ones were constructed. After this, the network views were edited according to the propositions, and they will be presented in chapter 5, together with some quotations from the transcripts or documents, as the illustration of the research results.

4.2 ACTIVE LIFE HOME

As mentioned in chapter 2, global ageing has posed severe problems to us today. The situation in Finland is particularly grim. The percentage of population aged 65 and above in Finland is 19% in 2013, compared to the world average of 8%. According to Organization for Economic Cooperation and Development (OECD), an aged society is defined when the elderly constitute 14% to 20% of the total population (Nazerfard, Rashidi et al. 2011). The elderly dependency ratio is 30% in Finland, compared to the world average of 12% (www.worldbank.org 2014), and these numbers are still increasing.

Active Life Home (ALH) is an innovative elderly care project in Finland aiming at solving the resource shortage in elderly care. Its goal is to develop a shared platform for various device and service providers to deliver care services to elderly people. This project is led by Active Life Village Oy (ALV)—a non-profit company founded by the City of Espoo, Aalto University and Laurea University of Applied Sciences to facilitate the development and commercialization of innovative ICT products, services, and concepts in elderly care. Three phases are planned for this project—R&D, piloting and commercialization. At the time the data was collected, the project was at the R&D phase and it is partially funded by Tekes, i.e., the Finnish Funding Agency for Innovation. Each phase of the project requires separate application for funding as there is an assessment between two phases determining if the project can get further funding from Tekes.
The Architecture of ALH Platform

The main idea of this project is to integrate the various devices and services on one web-based platform so that the users (elderly persons, caregivers, and administrators, etc.) can access the system with a single sign-on. There are three layers in the platform—ALH Portal, Personal Health Record (PHR) and Valpas Home Gateway (Figure 4.1). The three layers respectively correspond to the integration of user interface, data and devices.

ALH Portal is developed by Aalto University using Liferay portal platform. It consists portlets enabling functions such as user information management, device management, and customized access for different user groups, etc. The services from the partners and PHR are integrated to the portal using iFrame portlet.

The PHR is developed by PlayGround. It stores the data from the devices and services by offering a REST API for the partners to write and read data or the users can also provide the APIs of their systems for PlayGround to integrate the data. On the user interface, the data is displayed under four categories: 1) Health—the latest personal health measurements of the elderly, 2) Activity—their recent activities, 3) Alarm—all the alarms triggered, and 4) Health info—the history information of different health measurements.

The home gateway Valpas is developed by Aalto University, it integrates the devices with different communication means including Wi-Fi, Z-Wave, ZigBee and USB. The gateway then connects to Internet either with a built-in Ethernet port or a 3G modem.

The Devices

There are 13 device providers participating in this project at the time of this study. The names of the companies and the types of the devices that they provide are shown in Table 4.5.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addoz</td>
<td>Medication dispenser</td>
</tr>
</tbody>
</table>
Actors, Positions and Actions

By the time the interviews were taken, there were 16 partners involved in this project including the project leader ALV. Their roles can be described as follows (table 4.6).

<table>
<thead>
<tr>
<th>Actors</th>
<th>Role</th>
<th>Main Deliverables</th>
</tr>
</thead>
</table>
| Active Life Village  | Project Leader           | • Project management  
                      |                                                                                 | • Marketing and networking arrangement for the partners |
| Playground           | Data integrator          | • Database/ Activity and Health Record (AHR)                                         |
| Aalto University     | Platform provider        | • Gateway integration  
                      |                                                                                 | • Portal integration  
                      |                                                                                 | • Final integrated platform |
| Other companies      | Device provider          | • Interfaces of their devices or/and systems                                         |

TABLE 4.6 ACTORS AND ROLES IN ALH PROJECT
4.2.2 FINDINGS

The Degree of Structural Closure

To address the effect of structural closure, we explored the interviews to see if there is information suggesting actors have direct communication or collaboration, and how this relationship among them influences the cooperation. Many interviews suggest a low degree of structural closure, or structural holes, among these partners in the beginning of the project and that the degree of structural closure increased as the project proceeded:

"When we started the project, there were no dependencies between companies, but it has been interesting to see that this project has in a way glued some of the companies...they started to talk with each other directly as well not only through us." [Olli-ALV]

"Something that this project made possible is that these companies have started to work together." [PlayGround]

One interviewee said one motivation of them for joining the project is to get to know other partners involved, and some other actors also indicated that networking is a benefit. This suggests that the structural holes have a positive effect on cooperation by providing the opportunities for networking.
Networking was also another reason (for joining the project). I have met with several very interesting companies and I have seen many interesting product which I wouldn’t have noticed them otherwise. [Beddit]

I would say that this project is also helpful in terms of shorten the way to getting to know other companies. [Arcticare]

In this field, we have such a lot of vendors that are involved in this business (elderly and health business), so of course it is good to meet other companies in this consortium and talk about future solutions. [Vivaga]

During the project these companies started to communicate and work together, i.e., the degree of structural closure increased. According to several interviewees, this closure provided trust among actors and thus positively influenced the cooperation:

I would say that the trust between the companies has been even increased over time. In the beginning we could see that a few of companies were a little bit closed and not really willing to talk openly about their products...But I think these types of behavior have been changed over time and they are more open than they were in the beginning. [Raimo-ALV]

There are things that create binding in this consortium over time...for the moment there is not any force, contract or binding and it is mainly about the trust partners...when people get to know each other of course, so that takes the fiction away which makes it easier to work... [PlayGround]

When they start collaboration, the more they collaborate the more trust is within the companies. [Timo2-AU]

Therefore, the mechanism how structural closure influences cooperation in this case can be summarized in Figure 4.3. In the coding process, we used the term “structural holes” and “structural closure” to respectively represent “high degree of structural closure” and “low degree of structural closure”, hence in Figure 4.3, the word “contradicts” is used to denote the relationship. This Figure is created using Atlas.Ti 7.5 during the data coding. The nodes and the relations among them are grounded from the data, i.e., the transcription of the interviews.

![Diagram](image)

**FIGURE 4.3 THE EFFECT OF STRUCTURAL CLOSURE AND STRUCTURAL HOLES**
The level of Actors’ Control over the Interest-realization

Since there was no contract (Timo1-AU, PlayGround, Panu-AU) in the project enforcing the cooperation, the increasing structural closure evidently improved cooperation by enhancing the level of trust among actors. This trust might have been more important for some actors than others, depending on how much control they had on realizing their interests.

We expect that the device providers would be interested in the platform and they would hence have very low level of control due to the network effect of the platform, however the fact is opposite. We found that the device providers were more interested in the business opportunities ALH project provides such as market visibility and access to potential customers but not so much in the platform itself (table 4.7). When they decided to join the project, these opportunities were almost already assured by ALV. As long as the device providers remain in the project, they can gain the business opportunities. Therefore in the sense of achieving their interests of joining the project, they had relatively high control.

<table>
<thead>
<tr>
<th>Actors</th>
<th>Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Life Village</td>
<td>• Providing an innovative solution for elderly care</td>
</tr>
<tr>
<td></td>
<td>• Achieving emergent value from integration</td>
</tr>
<tr>
<td>PlayGround</td>
<td>• Achieving emergent value from integration</td>
</tr>
<tr>
<td></td>
<td>• Entering elderly care market</td>
</tr>
<tr>
<td></td>
<td>• Access to potential customers (Municipalities in Finland and projects in China)</td>
</tr>
<tr>
<td>Aalto University</td>
<td>• Access to real life use cases</td>
</tr>
<tr>
<td></td>
<td>• Article publication</td>
</tr>
<tr>
<td></td>
<td>• Research fund</td>
</tr>
<tr>
<td>Device providers</td>
<td>• Market visibility</td>
</tr>
<tr>
<td></td>
<td>• Complementary products</td>
</tr>
<tr>
<td></td>
<td>• Access to potential customers (Municipalities in Finland and projects in China)</td>
</tr>
<tr>
<td></td>
<td>• Networking</td>
</tr>
<tr>
<td></td>
<td>• Reference for future funding application</td>
</tr>
</tbody>
</table>

**TABLE 4.7 INTERESTS OF THE ACTORS**

Whilst the interests of Aalto University and PlayGround (Table 4.7) were aligned with the development of ALH platform, thus they were dependent on each other as well as on the device providers in realizing their interests. Especially since the device providers were more interested in the business opportunities than the platform itself, as well as they were small companies lacking of resources, they might have not been so motivated to be active in making their deliverables which are essential for the integration work of PlayGround and Aalto University (Figure 4.3, Table 4.7). Thus ALV, Aalto University and PlayGround needed to trust device providers in cooperating.

*PlayGround is dependent on the data from device vendors and what has happened is that when the device vendors are busy, they don’t have time to work on their interface to connect to PlayGround, so PG has been waiting to get access to the data. So there is a clear dependency in that relationship. [Timo1-AU]*
From technical point of view the starting point of this project is the technology of these companies, so without these companies there wouldn’t be anything for Aalto University to integrate. So that is basically, reason for the project to have companies, devices and data which is to be integrated. If there were not companies, they wouldn’t be any project, so Aalto in totally dependent on the companies and on the project. [Timo1-AU]

Admittedly, many interviewees have indicated that ALV, Aalto University and PlayGround were not dependent on any specific device providers but rather all of them as a whole. In fact, any of the device providers can be easily replaced with new ones [Raimo, PG, Matt, Timo, Olli]. However, as the project went on, the less easy it became to change these device providers as it generated a switching cost for the platform developers which further increases the dependence.

So then once the technical product is set, something can be changed in it, but basically it is easier to work with that in the case that just forget it and start to work on something new. [PlayGround]

The more they collaborate the more trust is within the companies. Then it is very difficult to replace one with some new comer… so the dependence is increased up so it’s quite strong. [Timo2]

Therefore the platform developers—AU and PG had less control over their interests than device providers did. When asked to evaluate the collaboration, ALV, AU and PG all indicated that the increasing trust emerged after they get to know each other has helped with the cooperation, but the device providers did not mention this once. Based on this, we conjecture that trust is more important to AU and PG because they have lower level of control over their interests. This finding can be summarized as Figure 4.4 (adapted from Figure 4.3).
The level of divergence

The ALH project is divergent in several ways. First, the goal of this project was to develop a common service platform for elderly care service in Finland and its new business model can bring divergent changes not only to the partners in this project but also to the health care industry and broader society.

Second, while the development of such a Smart Living platform is usually led by big corporations, this project was led by a non-profit company and dependent on public funding. The funding for development in this project merely covered part of the total costs (P1-P6, AU), but the partners could keep the intellectual property rights (IPR) of their individual development.

(ALH) is a little bit different from many projects that I have been earlier in, for example, working in a network together with Nokia, which then it always about a corporation giving a lot and giving also money for example or devices or resources to work on the project, but then also more or less saying what needs to be done [PlayGround]

195,000 Euros is the funding that we get from the companies and that covers 70% of our costs. So basically, we are financing 30% of the costs...If it was a commercial project, we would have more money, but then we wouldn't have the property right for that [Panu-AU]

Last, although ALV aimed to commercialize the platform in the end, there was uncertainty since ALH was at that time a project aiming at producing R&D results not at the deployment of the solution. In order to commercialize the platform, a second round of funding was needed [Olli-AU, and P1]. This could be done by getting funding from Tekes and Municipalities via public purchasing program, or by selling the solution to the current partners or other interested actors outside of the project [Panu-AU]. Nevertheless, the former was unlikely because the municipalities would like to have this platform integrated to their existing Enterprise Resource Planning (ERP) system and it required more funding which they could not provide [Timo-1, Vivago]. On the other hand, selling the solution to the current partners was also unlikely, as the companies involved were quite small and lack of resources.

The head of municipalities IT section wants to have integrated systems because integrated systems are easier to managed, but they need their own servers and they want to have connection with ERP systems which is costly as well [Vivago]

The municipality needs the integration (with their ERP system), but the situation in Finland is that the municipalities have lack of funding and resources...It is very easy for company to say that (the companies) they are committed or motivated, but when it comes to hard decision like for spending money for commercialization it is totally different and much harder. [Timo-1]

Therefore ALH was an unconventional project for the partners involved in terms of its innovative business model, insufficient funding, and uncertain future development. Most of the partners, according to the interview, had low expectation for the commercialization of the platform and the device providers were not even enthusiastic about the development of the platform itself. The motivations of these actors for joining the consortium were selective incentives such as business and research opportunities (Table 4.7) rather than the goal of the project—to provide a common service platform for elderly care. This might partially be due to how ALV tailored the pitch of the project to different actors according to their different interests in order to get them on board.
In the beginning, you know, nice words, don’t tell very much...because the challenge is that most of these companies see short term and thus ALV needs public money or some form of arrangement to market this idea...so far they (ALV) have only brought the idea of common marketing and common purchasing and to some extent the common data base. [Panu-AU]

ALV was the one who asked us if we want to participate in this project and explained that this is a good things to do, otherwise we wouldn’t have joint the cooperation. [Beddit]

We were contacted by Active life village to collaborate and apply research in this area...it seems to be a kind of opportunity to apply same technology and same kind of research findings that we had previously on this context. [Petri-AU]

By addressing the different interests, ALV attracted the partners to this project. However, we couldn’t find how structural closure or structural holes influenced the cooperation given the divergence of the project. The findings can be summarized in Figure 4.4.

![Figure 4.4 THE LEVEL OF DIVERGENCE OF THE PROJECT](image)

Alternative Explanations

Besides the factors mentioned above, there are many other factors influencing the ALH project. From the interview, we found that the main problem in the collaboration is that the device providers were not active. We have mentioned one possible reason for this: the interests of the device providers lied mainly in the business opportunities rather than the platform itself and this is further attributed to that ALV might have particularly pitched them with these business opportunities in order to get them on board. There are other possible reasons indicated as follows.

To start with, the device providers involved in ALH were all small companies with limited resources, and they were incapable to cooperate more actively than offering what they already
had and what they already planned to develop in-house. This is because they needed to invest a considerable proportion of their resources in activities which could bring them immediate and sufficient income for them to survive [Arcticare, Matti-AU, Panu-AU, Petri-AU]. Unfortunately, ALH was not such a project which could provide such income. First of all, as we have indicated earlier, there was no sufficient funding for the project. Second, there was no guarantee for future customers [Olli1, Petri, Matti, Timo-1, Raimo]. Moreover, according to the device providers, since there were no customers yet, there were no concrete customer requirements. Thus they also did not know how to actively contribute to the project [Arcticare, Beddit, Vivago].

On the other hand, the device providers were not active partially due to the design of the ALH platform. Some of the device providers, i.e., Menumat, Vivago, Everon and Helmivision, had their own home gateways, and they were reluctant to connect their devices to the ALH home gateway because they believed that the project could use one of their gateways [Panu, Vivago, Raimo-ALV]. Moreover, several vendors had overlapping devices or services. For instance, many partners offered similar location sensors and movement detectors, but ALV determined what devices and services each could offer, this then led to discontents among the vendors [Panu, Vivago]. In addition, another consequence of partners having overlapping functions is that some vendors were reluctant to work due to the presence of competitors. [Vivago, Timo1, Matti, Panu].

Project management could also be one source of the cooperation problem in this project. For example, the managing director of ALV at that time pointed out that there was insufficient technical expertise within ALV for it to be able to steer the project [Olli2]. Furthermore, he mentioned that the architecture design of the platform was not clear in the beginning of the project and it might have impeded the cooperation [Olli2, Raimo-ALV]. Some partners also indicated that the project management of ALV was problematic and that there should have been stronger leadership [Vivago, Petri].

4.3 CONCLUSION

In this chapter, we examined the propositions formulated in chapter 3 by conducting a secondary case analysis on Active Life Home (ALH) project in Finland. The detailed findings of the case analysis can be found in section 4.2. For the summary of the findings, please see subsection 5.1.2.
In this chapter, the main findings of this study will be presented in section 5.1. Next, we will discuss the theoretical contribution and implications for CSP provision in elderly care in section 5.2. In section 5.3 we will provide recommendations for practitioners. Lastly, the limitation of this study and recommendations for future research will be presented in section 5.4.

5.1 MAIN FINDINGS

This study is carried out to answer the research question: What are the key factors that can be leveraged to facilitate cooperation for the establishment of a CSP in Smart Living domain and how do they influence cooperation? It consists of following three sub-questions:

a) What are the roles of literature on collective action and that on institutional entrepreneurship in comprehending the cooperation problem in establishing a CSP in Smart Living domain?

b) According to the literature, what are the key factors that can be leveraged to facilitate cooperation in a given CSP provision project and how do they influence the cooperation?

c) How do the key factors influence the cooperation in the empirical case of Smart Living CSP provision?

As we mentioned in section 1.4, the literature review is conducted to answer sub-question a) and b), and the case study should answer the sub-question c). In this section, we will present the answers to these questions.

5.1.1 FINDINGS IN LITERATURE REVIEW

To comprehend the cooperation in establishing a common service platform, we have studied four streams of literature—collective action, institutional entrepreneurship, platform theory and IAD framework. Platform theory is studied to offer insights into the context of the cooperation; literature on collective action and that on institutional entrepreneurship are adopted to provide two different perspectives to look at the cooperation; and IAD framework is used to integrate the other three streams of literature for this study. There are three steps in the literature review, corresponding to the three sections 3.1, 3.2, and 3.3. In section 3.1, we studied the four streams of literature separately, and identified several key factors that can be leveraged to facilitate cooperation by focusing on the literature on social capital in the research field of collective action and institutional entrepreneurship. The term social capital refers to a series of factors. These factors are related to the social structure or the networks, and they can facilitate certain ends for certain actors in the social structure (Burt 2005). Four forms of social capital are identified as important in this section—structural closure, structural holes, institutions, and the central position in a network. Among them, we chose the first two forms of social capital to study in the empirical case, because the other two have

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already been researched extensively. In section 3.2, we summarized the results from 3.1, and we used “the degree of structural closure” to represent the independent variable of the case study. The degree of structural closure can be seen as a continuum, and the two forms of social capital mentioned above respectively denote two ends in this continuum. To be more specific, structural closure refers to a relatively high degree of structural closure, and structural holes to a low degree. The degree of structural closure influences cooperation in a complex way. It can exert both positive and negative effects on cooperation, and how it influences cooperation depends on the specific condition. In section 3.3, we discussed the different assumptions and ways of framing cooperation problems in the literature on collective action and institutional entrepreneurship by using the concepts from IAD framework. Specifically, the scenarios defined by literature on collective action and institutional entrepreneurship can be regarded as two different action situations. The degree of structural closure can be seen as the external variable influencing the action situations. Therefore, to find out how the degree of structural closure influences cooperation, we compared the two types of action situations depicted by collective action and institutional entrepreneurship. Two variables are identified as the main moderating variables that affect the influence of the degree of structural closure on cooperation—the level of control actors have in realizing their interests and the level of divergence the project shows. Accordingly, two propositions are made for the case study.

In conclusion, the literature review answers the research questions a) and b). In terms of question a), the role of the literature on collective action and institutional entrepreneurship is to help define the cooperation problem in establishing a CSP for elderly care from two different perspectives. In terms of question b), the key factors we identified that can be leveraged to facilitate cooperation in the literature are the different forms of social capital. For the case study, we focus on the degree of structural closure and its effect on cooperation is subject to the moderating effect of the level of control actors have and the level of divergence of the project.

5.1.2 FINDINGS IN CASE STUDY

In the literature review, we identified structural closure and institution as the key factors influencing cooperation in establishing a CSP, and their effects on cooperation are moderated by the two conditional factors—the level of control and the level of divergence. Despite the moderation, there is always a positive effect of institution on the likelihood of cooperation since it enhances the level of trust, but the effect is stronger when the actors’ level of control is lower. Structural closure also partially influences cooperation with the same mechanism, and it has two other ways of influencing cooperation as shown in figure 5.1. According to the literature on institutional entrepreneurship, there is a crossover interaction effect between structural closure and divergence, i.e., structural closure has a positive effect on cooperation when the divergence of the changes the project might bring is low since it provides trust and ease of mobilization, but it has a negative effect when the divergence is high because higher level of structural closure increases the probability of actors forming coalition against the project. Since many researches have done to explore the effect of institution, we focused on the effect of structural closure in the case study and two propositions are made about the effect of structural closure on cooperation under the moderation of divergence and actors’ control. The case we selected is the Active Life Home (ALH) project in Finland.

The effect of structural closure

We set out the case study by finding out the different influences of structural closure on cooperation in this project and we found two. First, before the ALH project starts, the level of structural closure is low among the partners, and the partners appreciate the opportunities for networking this project offers them. We thus concluded that the low level of structural closure
or a network rich in structural holes positively influence the project by providing networking opportunities. Second, as the project proceeds, the structural closure starts to grow higher and some partners think the trust associated with the increasing acquaintance improves the cooperation. Then we inferred that the structural closure has a positive effect on cooperation by providing trust to the partners.

**The moderating effect of control**

We expected to find that the level of control has a negative moderation effect on the positive effect of structural closure (or negative effect of structural holes) on the likelihood of cooperation. We started by finding out the main interests of these different partners and then evaluated how dependent each of them is on other partners with respect to realizing their own interests, and we found that these partners who are more dependent are also the ones who mentioned in their interviews that the increasing connection among the partners has enhanced the level of trust which, according to them, is very important for cooperation. Hence, the proposition is supported as this pattern matches with the expectation. However, although the partners with low level of control said trust is important while the ones with high level of control did not mention trust once, there is no direct evidence that the partners regard trust differently due to their different level of control. Therefore, we consider the proposition as partially supported.

**The moderating effect of divergence**

As we indicated in the literature review, the project’s level of divergence moderates the effect of structural closure on cooperation due to 1) that divergence is an undesirable feature, and 2) that the ease of mobilization associated with high degree of structural closure is a double-edged sword in fostering cooperation. We expected that when the divergence of the project initiation from the status quo is high, structural closure will have a negative effect on cooperation because the actors can easily form a coalition against the project while the structural holes in the network provide more freedom than structural closure does for the project leader to pitch the actors strategically. We also expected that this negative effect of structural closure will turn positive when the divergence is low because the actors would resist less to the non-divergent project and they are less likely to form coalition against it, at the same time the freedom in pitching becomes unnecessary while the project leader can better mobilize the actors and their resources in a closed network. However, we did not find direct evidence on these features of structural closure or holes, namely the ease of mobilization or forming coalition, and the freedom in pitching different actors. Nevertheless, we did find some evidences that 1) the project is divergent in several aspects such as it is led by a non-profit organization, the pay-off structure is different from a typical project in the field, and the platform itself is subject to lots of uncertainties in future development, and 2) the project leader ALV have used strategic pitches to foster the cooperation from the partners before the project starts. These evidences indirectly imply that the low structural closure in the beginning might have helped with the cooperation in the divergent project. However, since there is no evidence suggesting that the strategic pitches are done because of the divergence of this project, nor is there evidence that high level of structural closure would be less favorable in this situation, we consider proposition 2 unsupported.

In conclusion, the case study provides a slight insight into how the structural closure influence cooperation in establishing a CSP, and thus answers the research question c). However, due to the lack of evidence, the propositions are not properly evaluated as they are not elaborated or verified, nor are they rejected. We will further discuss this as a limitation in section 5.4.
5.2 CONTRIBUTIONS AND DISCUSSIONS

As we mentioned in chapter 1, the objective of this research is twofold.

a) To broaden the application of collective action and institutional entrepreneurship by combining the two streams of theories with platform theory;

b) To contribute to Smart Living field by: 1) providing a perspective for viewing the cooperation problem in the establishment of Common Service Platform (CSP); and 2) providing a tentative suggestion on how to facilitate cooperation in a platform provision project.

In this section, we discuss the contribution of this study to theory, corresponding to objective a), as well as to the domain of smart living for elderly care, corresponding to objective b).

5.2.1 THEORETICAL CONTRIBUTIONS

The main theoretical contribution of this study is that it provides an insight into the means how various streams of literature can be applied together in a structured manner. In this study, we practiced a means of conducting literature review with the aid of IAD framework, which is a meta-theoretical tool that can be used to analyze different theories. In specific, we treated the scenarios discussed in the literature on collective action and institutional entrepreneurship as two types of action situations; the attribute of platforms (i.e., network effect) discussed in platform theory is deemed as an external variable (i.e., biophysical condition) that influences the action situations and it is a given variable in this study; the independent variable of this study, i.e., the degree of structural closure, and other influential factors such as institutions and social position of the actors, are also external variables. External variables influence the outcome via action situations. By viewing the literature and the concepts this way, it enables us to structure the literature review, especially when multiple distinctive theories are applied to the same empirical problem. Moreover, by treating the scenarios depicted in different literature as action situations, it helps us be more aware of the perspective we are taking and at the same time be aware of the possibility of alternative perspectives.

Another theoretical contribution of this study is that it demonstrates a way to properly apply the theories to an empirical problem. After we considered the scenarios depicted in collective action theory and institutional entrepreneurship as two types of action situations, we looked into the working parts by which an action situation is defined in order to clarify in more detail how the two streams of literature set the scenarios. This process can help us explicitly reveal the assumptions and ways of problem framing in each theory. By being aware of the assumptions and ways of framing problems underneath the theories, we can know what theories are applicable and how applicable they are, and we can also apply them more properly to the empirical problem. Some theories have rigid conditions, and it might be relevant to an empirical problem but not directly applicable. Under this circumstance, knowing the conditions underneath the theories offers us more room for maneuver, that is, we can adjust the conditions to make the theories applicable to the empirical problem. For instance, in the ALH case we studied, the start-up problem turned out to be not a major concern for the project, but we could still apply the collective action theory in the case study by adding a moderating factor on the relationship between the key concepts. Specifically, we considered the settings of collective action problem, such as start-up problem or free-riding problem, etc., as action situations where actors have low level of control in realizing their interests, and then used the level of control as a moderating variable on the relationship derived from collective action theory.
Besides the contribution to the way of applying the theories, this study also contributes to the theories in the following aspects. First, it extends the application of collective action theory. While researches on collective action mainly focus on the provision of public goods and the sustainable usage of common pool resources (e.g., researches from Olson (1971), Hardin (1971), Ostrom (1998, Ostrom 2010), and Oliver (1993), etc.), there are only a few researches using collective action theory to study the provision of platforms or goods with network effects. This study builds on the foundation of existing researches on the application of collective action theory to the provision of goods with network effects (Oliver, Marwell et al. 1985, Marwell, Oliver et al. 1988, Marwell and Oliver 1993), and provides an insight into facilitating cooperation for the provision of a common service platform. Second, the combination of collective action and platform theory also provides a hint on how the start-up problem in platform theory can be viewed and resolved. Third, although the case study did not provide compelling evidence on the propositions, it did give new insight into the mechanism how the degree of structural closure influences cooperation. Specifically, in the ALH project, opportunity for networking was considered as an important motivating factor in the case. We thus infer that besides the freedom of pitching actors strategically and the lower probability of incurring coalition against the project, the structural holes or low degree of structural closure in the network of the project leader can also help facilitate cooperation by providing opportunities of networking for the actors.

5.2.2 IMPLICATIONS FOR COMMON SERVICE PLATFORMS IN ELDERLY CARE

Platform business or platformization, meaning to provide a platform with core components that can be shared by various complementary devices and services, has become the buzzword of today. In smart living field, the aim of providing common service platforms for elderly care is to solve the issues of compatibility and interoperability of smart living solutions for elderly care. For the platform providers, gaining the cooperation from complementors and other users to join the platform is the crucial starting point to succeed.

This study indicates two potential challenges to achieving cooperation for establishing a CSP. The two potential challenges are respectively related to the attribute of a CSP and the “institutional space” around it. In terms of the challenge associated with the attribute of a CSP, we mean the start-up problem that could be induced by the network effect of the CSP. The second challenge is associated with the institutional space around a CSP. Institutional space refers to the set of rules that govern the production, distribution, and consumption of associated artifacts (Garud 2002). The challenge is that since the introduction of CSP might tremendously change the way of doing business for many actors, there might be resistance to the project initiation.

With respect to the two challenges, this study provides insights into the ways of solving them. By reviewing the literature on platform theory, we gained an understanding on the start-up problem induced by network effect, as well as some general directions to cope with it. These directions are mainly about providing free accesses, rewards, or other material incentives to attract early adopters. Besides, to gain a broader insight into other possible solutions, we also reviewed collective action theory since the start-up problem can be seen as a collective action problem. According to collective action theory, the key to solve the cooperation problem is to increase trust among actors. Examples of factors enhancing trust are institutions (i.e., coercive rules), structural closure, and strong ties, etc. On the other hand, to shed light upon the issue of resistance or inertia to change, we reviewed the literature on institutional entrepreneurship. Factors such as the social position and the attributes of the network can influence the efficacy of facilitating cooperation.
Among the factors of which the effects on facilitating cooperation are discussed in the literature, we chose to focus on the degree of structural closure in the case study. This factor is discussed in both collective action and institutional entrepreneurship, and it influences cooperation differently in the two streams of literature. This study shows that the effect of this factor is contingent on the specific conditions. Based on this, some tentative recommendations can be made for the practitioners, and we will present the recommendations in section 5.3. In addition, since the literature and propositions are not specific to a certain field, and we also have clarified the conditions under which the effect is valid, the result of this study can be generalized to different fields.

5.2.3 COMPARISON BETWEEN THE ORIGINAL CASE STUDY AND THE SECONDARY ANALYSIS

As a secondary case analysis, this study adopts a different perspective from the original study by Dr. Nikayin (2014) on the Active Life Home project.

The original case study focuses on the effects of the following six factors on the likelihood of collective action—leadership, selective incentive, heterogeneity of resources, heterogeneity of interests, interdependency, and platform openness. This study, on the other hand, looks into the effect of network formation among the actors, i.e., the degree of structural closure, on the likelihood of cooperation under the moderation of the following two factors—actors’ level of control over realizing their interests and the level of divergence of the project initiation. Moreover, the concepts of interdependency and selective incentive from Dr. Nikayin’s research (2014) can be incorporated in the concept—actors’ level of control over realizing their interests—from this study. The difference is that we use it as a moderating variable instead of an independent variable. Another subtle difference is that instead of using collective action to refer to cooperation, we simply use the word cooperation and define collective action narrowly as the cooperation under dilemmatic situations which the secondary analysis did not find in the ALH case.

5.3 RECOMMENDATION FOR PROJECT LEADERS

Based on the findings of this study, we can derive a tentative recommendation on the strategy to adjust the degree of structural closure in order to facilitate cooperation.

First, according to the level of divergence of the project initiation, we can choose partners who best match with the project. The divergence of the project initiation can be evaluated by the extent to which the potential changes the project can bring break with the way of thinking and acting taken for granted by the partners. Specifically, if the project imposes potential changes divergent from the institutional status quo, it is better to choose partners which are relatively disconnected with each other. This is because divergent projects are likely to incur oppositions, and the connected actors can easily form a coalition against the project. Also, it allows more freedom in pitching the partners strategically according to their different interests and preferences if they are not closely connected, since they are less likely to share information with each other and consequently lead to an inconsistent image of the project leaders. Besides, the opportunity of networking among disconnected partners can be used as an attraction to get them on board. Conversely, for project imposes non-divergent changes, it is better to choose partners who are connected with each other because there is no necessity to pitch them differently while the trust among them and their ease of mobilization can facilitate the cooperation.
Second, for projects naturally inflicting on the partners low level of control over realization of their interests, such as a project with network effect or other types of externality, it is important for the project leader to enhance trust between the partners, especially between the partners who have lower level of control than others over the outcomes they wish to achieve and the partners they are dependent on in achieving these outcomes. The ways to increase trust include fostering structural closure, and providing contracts or other enforced rules (i.e., institutions), etc. If the project also imposes divergent changes, then providing contracts or other enforced rules should be chosen than fostering structural closure. This is because structural holes are needed to start a project posing divergent changes, and the institutions can offer the high level of trust needed by actors with low level of control.

Third, it is crucial to implement proper project management. Although there was no interview question about the project management addressed to ALV, the interviewees provided some important insights on this subject. For instance, some partners thought there was no leadership in this project; the scope, the task distribution, and the time planning of this project were problematic; and they were not satisfied with the results at the moment when the interviews were conducted. The interviewees from ALV also indicated issues like the inadequacy in project planning, and lack of technological knowledge to steer the project. These problems can be solved by improving the project management practices.

5.4 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

There are several limitations of this study. First, we used collective action and institutional entrepreneurship to help understand the cooperation problem of establishing a common service platform, nevertheless there are also many other theories that can be used to provide different perspectives to look at the cooperation. The future research can thus try to apply more other different theories.

Second, as we aim at providing recommendations to project initiators, we omitted many factors for they are difficult to leverage. These factors range from individual level conditions such as personality (Fligstein 1997, Garud 2002, Battilana 2004), to field-level ones such as jolts, crisis and the level of institutionalization of the field, etc.(Leca, Battilana et al. 2008). Since this study adopts a case study method, which is usually used to find direct evidences about how the independent factors influence the dependent variable, the omission of other factors might not be a problem. For instance, an interview question can be asked to the interviewee about the relationship between two concepts and we can see from the answer if they are related or not and why. However, for quantitative research based on the evidence of correlations, it is important to take into consideration these factors, since the result might not be significant due to the potential moderating effects of other factors. Therefore, for future quantitative researches, it is crucial to obtain these data. IAD framework can serve as a checklist of the data that is needed. Besides, if we can define all the working parts in action situation in IAD, agent-based modeling would also be a good research method to find out how external variables influence cooperation.

Third, due to the limitation of time and access to the cases, we did a single case study for this thesis. Thus the validation of the results is limited. In the future, more case studies can be conducted to evaluate the propositions. The recommendation on case selection will be discussed in the next paragraph.
Fourth, since the case selection and interviews were conducted before the propositions of this study were made, this case did not provide much evidence as we expected. To start with, the case selected did not show a dilemma caused by the network effect of the platform as we have expected. We expected that the device providers would be interested in the platform itself, and then the fact that they have little control over its success can lead to a dilemmatic situation where they need trust. According to the interview, the device providers were interested in the business opportunities associated with the project and they did not consider the platform itself as beneficial. Only one respondent mentioned that actors having little control over the provision of the platform can be a problem, because if they could not make a difference anyway they would be reluctant to contribute\(^\text{18}\). However, since the managing director of ALV at that time disagreed with this opinion\(^\text{19}\) and the other respondents also indicated otherwise, we consider the case did not show a dilemmatic situation. Therefore future study could select more suited cases, namely, the cases where the partners do have an interest in the common service platform and they also have very low level of control over its success.

Fifth, this study is conducted after the case has been selected and the data collected, what this study should have done is to first do a preliminary study on the case, then frame a practical problem grounded from the case, and lastly select the literature according to the practical problem. Unfortunately, this study failed to operate a thorough preliminary study on the case, and the literature was merely selected according to the interests of the author. As a consequence, the literature does not match with the practical problem perfectly. Future study could pay more attention on matching the case selection with the literature.

Sixth, during the study, we realized that the case selected might not match with the problem framings in the literature, therefore we loosened the condition in the literature for the propositions. Since collective action theory is built on dilemmatic situations, and the dilemmatic situations can be represented as actors having low level of control over the outcome they wish to achieve, we used the level of control as a moderating effect. We assumed that the less control the actors have, the more similar the situation is to a social dilemma, and therefore the stronger the effect of the degree of structural closure on cooperation is. However, to generalize all the dilemmatic situations into actors’ low level of control over the outcome they wish to achieve might not be rigorous, and we failed to provide compelling arguments for it. Future study could examine if the dilemma can indeed be attributed to actors’ low level of control or not, the book *Mathematics of Collective Action* by Coleman (1973) might provide some insights.

Seventh, in the case study, when the respondents indicated that the trust had been enhanced since they get to know each other, we inferred that the structural closure has enhanced the trust. Nonetheless it could be the strength of ties had become stronger as they repeatedly interacted

\(^{18}\) Citing the respondent, “so it appears that the success of the whole is not dependent on any particular entity, except for this implementation maybe the AHR has a central role because it integrates the others, but basically the companies don’t seem to be very dependent on each other. This is not something like building a ship or a plane where different companies build different parts of it, and if there is one thing missing the plane won’t fly... The success is not so critically dependent on the companies working together. That has also been held back this project, because I’ve been in some other projects where it was critical that the companies work together. This is a different case...I think it (interdependency) is quite important. You can say if this concept of Active Life Home would demonstrate a solution where all these parties add value and then where the lack of some parties would dramatically diminish the value, then probably there would be direct feasibility to commercial success which is not the case here.” [Matti]

\(^{19}\) Citing the respondent, “No, I don’t think that (lack of commitment from the vendors) is the reason (that the project was not going well). It was the design principles, the design principle was that let’s develop an environment where companies can join without having needs to re-develop their own solutions, and they can attach their existing solutions to the platform, that means we don’t need so much involvement and commitment from those actors” [Olli]
during the collaboration or other consortium events. Since there was no information on it in the interview, we cannot know which one we should attribute the enhanced level of trust to. In the future study, the questions can be asked more explicitly.

Eighth, the assumptions we made on actors and the situations might not be true. Again this can be attributed to the case selection. Future study could try to examine if the assumptions are true by formulating proper questions to the interviewees.

Ninth, we studied the effect of the degree of structural closure on cooperation under different circumstances. However, we did not investigate the overall effect of the factor on cooperation is positive or negative in one case. Future studies can try to explore more in this direction. There are two possible ways to look at this. One is to try to investigate the effect of the degree of structural closure on cooperation, under the moderation of the two factors—level of divergence and the level of control—concurrently. Another possibility is to look at the two effect in two phases, for instance, the start-up problem might not be salient in the beginning due to the lack of information but the resistance to a very divergent project might be, and during the project proceeds, the dilemma situation could become clearer and cause a problem.


