



SCHOOL OF
ECONOMICS AND
MANAGEMENT

Next step...

A qualitative case study on how to develop a MaaS capability

by

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Abstract

Title: Next stop ... a qualitative case study on how to develop a MaaS capability

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Purpose: This study aims to increase the understanding of how companies develop MaaS as a capability

Theoretical Perspectives: This study is based on capability theory, with an emphasis on how to develop capabilities. This is combined with previous research on how to develop service capabilities, as well as research within the concept of MaaS.

Methodology: Qualitative multiple-case study with an abductive research approach.

Empirical foundation: All empirical data was collected via eight semi-structured interviews with MaaS experts at seven public transport companies in Scandinavia, all with different kinds of strategies towards the development of MaaS

Conclusion: Based on the findings, this study argues that there are eleven different factors public transport companies consider important to develop MaaS successfully. Out of these factors, four of them were not discovered in previous research and are thereby considered the main theoretical implications of the study as they add to the previous literature. These theoretical implications complement the existing theoretical focus by highlighting the importance of being open to new things, having the courage to prioritize and try these new things, and learning from the trials that are being made. Without this kind of mindset, MaaS development is often being inhibited, despite the fact that the company has most of the other conditions in place for MaaS.

Keywords: Capability development, Service capabilities, Servitization, MaaS

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1. Introduction

1.1 Empirical background

People have always strived to interact with others whether the personal objectives have been sharing, trading or just enriching life (Eriksson-Zetterquist, Kalling & Styhre, 2011). Several technologies are and have been involved in organizing the process of interaction and transaction. One of the earliest forms of transportation that have been in use for possibly ten thousand years is the ship (Lavery, 2004). Later, around 4000 BC, the wheel was invented followed by the invention of the four-wheeled wagon a couple of centuries later (Dyer, 1985). In modern times, the invention of the car did not only make it possible for people to move around more freely, it also had a positive effect on people's sensation of power, freedom, status, and superiority (Steg, 2005). Today, public transport has a crucial function to satisfy the demands of citizens and thus making it possible for people to travel for many different purposes (Skorupa, Toader & Kryszak, 2020). Public transport facilitates interaction within cities and enables workers to live in high-quality residential areas while working in the most productive places (Redding & Rossi-Hansberg, 2017). The quality of public transport services has also been shown to positively affect the quality of life among citizens (Ismail, Hafezi, Nor & Ambak, 2012).

New technology and new services have recently raised the issue of how to integrate several different mobility services in public transport to further increase the quality of life among citizens. One of the most important things happening within public transport right now is the movement towards Mobility as a Service (MaaS), a completely new form of public transport that can be crucial for competitive advantage among the public transport companies (Wong, Hensher & Mulley, 2020). International Association of Public Transport (UITP) (2019) describes MaaS as the integration of different transport services, including public transport, car-sharing, bike-sharing, scooter-sharing, taxi, and car rental in one single digital mobility platform that also offers integrated planning, booking, and payment service. The key concept behind the growing popularity of MaaS offerings is the flexibility and the potential of different travel modes to

provide a more efficient, more pleasant, or cheaper travel and thereby increase the quality for the passenger (Wong, Mulley & Hensher, 2020). Many authors argue that MaaS will be the next paradigm shift in transportation and that the main reason for this is that MaaS addresses many of the greatest transportation issues of today in terms of environmental sustainability, traffic congestion, and accessibility (Cole, 2018; Hoadley, 2017).

However, with very few actual MaaS offers in real markets (Jittrapirom, Caiati, Feneri, Ebrahimigharehbaghi, Alonso Gonzales & Narayan, 2017; Li & Voegelé, 2017), and a lack of transparency in sharing how successful those few MaaS offers have been, the call for trials has grown throughout the world (Ho, Hensher, Reck, Lorimer, & Lu, 2021). In 2018, a transport company in Manchester set up a MaaS trial where several modes of travel were offered in personalized journey plans such as buses, trams, car share, bike share, and walking (UITP, 2019). Extensive analysis showed how MaaS had the potential to create more sustainable travel behaviors since the trial led to a significant increase in the willingness to use public transport, walk or cycle among the participants (UITP, 2019). Also, six months following the trial, 82% of the participants wanted MaaS back and a majority of them were willing to pay an increase in their monthly travel expenses for MaaS (UITP, 2019). Successful trials like this point to the fact that MaaS is worth investing in for the future of mobility, and many public transport companies are now considering MaaS in their strategies. Therefore, it is important to get a further understanding of what factors are crucial for the successful implementation and development of MaaS since that will explain which companies succeed.

MaaS has lately become one of the buzzwords in the line of many X as a service (XaaS). The classic view of ‘servitization’ is to add value by adding services to manufacturing companies (Brax, 2005), for example moving from producing and selling books to adding a service that also rents out the book, a more modern example of servitization can be viewed in the automotive industry, in which companies include services such as insurance and finance, which can be added to the offer when products are being bought. The interest and affection for servitization, defined as a service, has grown to the extent that everything soon will be offered as a service (Banerjee, Friedrich, Bash, Goldsack, Huberman, Manley & Veitch 2011; Li & Wei, 2014). Lately, the term servitization has also come to include the bundling of several services together (Normann, 2001;

Reck, Hencher & Ho, 2020) which MaaS is an example of. Instead of adding a service to a physical product, which is the classic view of servitization, the service is instead added by bundling existing services together. This shift towards MaaS within public transport is one step towards servitization of a new industry which makes it interesting to study.

We see the public transport companies' development towards offering MaaS as a capability development, which is a common way of considering capability development in strategy theory (Almer & Hashai, 2004; Barney, 1991; Leonard-Barton, 1992; Long & Vickers-Koch, 1995). Within capability theory, we further choose to study the development of MaaS at three different levels, as a capability, as a service capability, and as a MaaS capability.

1.2 Theoretical Background

Organizations achieve competitive advantages predominantly by developing and deploying resources and capabilities (Peteraf, 1993; Barney, 1991). Resources are productive assets the firm owns; capabilities are what the firm can do. Resources per se do not confer competitive advantage but must be transformed into capabilities to do so (Ulaga & Reinartz, 2011). We have chosen to see MaaS as a capability and therefore, in order to successfully implement MaaS, a company needs to be able to build a MaaS capability.

However, since MaaS is a concept at a pre-commercial stage there is still no suggested strategy on how to achieve successful development of MaaS (Sarasini, Sochor & Arby, 2017), and there have still not been any studies that define MaaS as a capability. The few empirical studies there are on how to develop MaaS are also all pointing in different directions, resulting in a lack of a holistic perspective (Arias-Molinares & García-Palomares, 2020). Since MaaS can be a crucial capability to develop in order to gain a competitive advantage as a public transport company, MaaS capability is worth becoming a concept of its own. It is primarily a matter of a lack of good theories and models for understanding the development of MaaS which we want to remedy and thereby contribute to research in the field of MaaS capabilities. We will therefore apply capability and service capability literature, supplemented with findings from empirical MaaS

studies, to construct a preliminary framework. Post empirical findings, we will primarily position our conclusions in the growing MaaS research.. It is the lack of understanding of the development of MaaS that is the base of the main purpose, but we believe that service capability and capability literature can also be helped or developed by our observations. Capability theory always needs to be updated by applying it to new societal challenges and issues (Leonard-Barton, 1991; Barney, 1991), where MaaS, as a capability itself, can be seen as an example of such a new thing that can help us understand and further extend our knowledge on the concept of capability and service capability.

1.3 Purpose Statement and Research Question

The purpose of this study is to increase the understanding of how companies develop MaaS as a capability. For this purpose, we have chosen to study MaaS, and how public transport companies implement and develop MaaS solutions. The aim of this study is to provide a broader understanding of how a public transport company successfully can develop a MaaS concept, thus also increasing the understanding of capability development.

For this purpose, a multiple case study is being made of seven public transport companies in Scandinavia. More specifically, eight employees working with the development of MaaS are being interviewed on their perception of factors needed to develop MaaS successfully. All of the case companies are state-owned public transport companies that are all in the process of either implementing a MaaS concept or developing an already implemented concept, all with different kinds of strategies. To explore the purpose, the following research question is formulated:

Which factors do public transport companies experience as crucial to successfully developing MaaS?

1.4 Thesis Outline

Following the introduction, chapter two provides the theoretical foundation for the study and includes an overview of existing research in the field. Previous research on capabilities, service capabilities, and MaaS will be presented and the chapter will be concluded with a summarized preliminary framework. Chapter three presents the methodology chosen for the study and goes into depth discussing the research approach, research design, data collection and data analysis. The chapter will end with a reflection on the method in terms of validity, reliability and ethical considerations. Chapter four presents the findings that were conducted through the interviews, followed by a presentation of the revised framework. In chapter five, the research question of the study is addressed by a discussion of the findings compared to the previous research. Lastly, chapter six concludes the study by answering the research question as well as discusses limitations and suggestions for future research.

2. Theory

This chapter will provide the theoretical foundation for the study and include an overview of existing research. Since MaaS can be seen as a capability, and further explained as a service capability, previous research on all three levels will be presented in three different sub-chapters: capabilities, service capabilities, and MaaS. In the first part, a model of dimensions of a capability by Leonard-Barton (1994) will be presented where all of the dimensions need to be taken into account while developing a capability. This model will then be used in the following two sub-chapters as a way of dividing up previous research presented on how to develop service capabilities and how to develop MaaS. We will conclude the chapter by providing a preliminary framework where previous research on how to develop MaaS and service capabilities will be summarized within the same dimensions.

2.1 Capabilities

Capability theory is a well-studied object by scholars over the years. In a broad sense, capabilities are defined as knowledge, experience, and skills (Richardson, 1972) that companies invest in, develop and foster in order to create an edge over their competitors (Barney, 1991). Capabilities can be the source of competitive advantage (Barney, 1991), they can also be the driver for certain strategic actions such as diversification, focus, actions, innovation, and business development (Gibe & Kalling, 2019).

Capabilities are broadly classified as operational or dynamic. Operational capabilities enable firms to conduct daily activities, such as providing existing products and services to customers; while dynamic capabilities enable firms to alter their activities to address new market opportunities (Winter, 2003). Our focus in this study is on the operational capabilities that support firms in earning a living through developing and delivering services, rather than the mechanisms by which they change over time which would be dynamic capabilities.

Capability development refers to creating a new capability or enhancing an existing one (Teece, 2016). A core capability is the knowledge set that distinguishes and provides a competitive advantage, and corporate survival depends upon successfully managing when core capabilities are evolving (Leonard-Barton, 1992). The development of core capabilities is critical when setting strategies for organizations (Long & Vickers-Koch, 1995), and organizations need to develop their core capabilities to excel in the contrivance of core products and to develop the innovative business model (Almer & Hashai, 2004; Clark, 2000; Laurie, Doz, & Sheer, 2006; Prahalad & Hamel, 1990; Zook, 2007).

When radically new capabilities need to be developed, there is a risk that firms fall into competency traps (Leonard-Barton, 1992) which is a false belief that your past principles, ideas, and mental models will continually lead to future successes. This can be connected to the concept of path dependency where decisions made in a company are dependent on previous experiences or decisions made in the past (Vergne & Durand, 2010). For instance, a firm's existing marketing capability, particularly its knowledge of customers, makes it more likely to develop technologies that appeal to existing customers as opposed to a new set of customers (Christensen, 1997). There is several ways to evaluate the capabilities of a firm and how to develop them, for example, Barney's RBV (1991), the Service logic (Skålen, 2018), and Dynamic capabilities (Eisenhardt & Martin, 2000) We have however decided focus on the approach on how to develop capabilities according to the model of Leonard-Barton (1991).

Leonard-Barton (1992) explains how a core capability contains four dimensions, and how companies need to think about all of the dimensions when developing such a capability. The four dimensions may be represented in very different proportions in various capabilities, but all four dimensions of core capabilities reflect accumulated behaviors and beliefs based on early corporate successes. The dimensions are the following:

1. *Employee knowledge and skills* embodied in people
2. *Technical systems*, the skills, and processes in the technical system get easily outdated, having technical knowledge helps organizations to refine and develop these systems.

3. *Managerial systems*, representing formal and informal ways of creating knowledge
4. The *values and norms* assigned within the company to the content and structure of knowledge

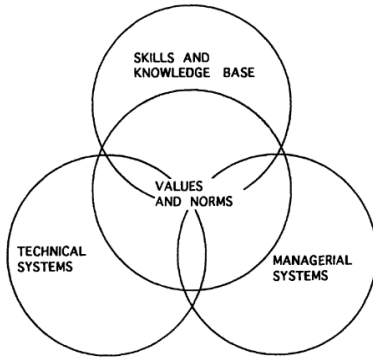


Figure 1 The dimensions of a core capability (Leonard-Barton, 1994, pp 114)

For this study, Leonard-Barton's (1994) model of factors needed for capability development are going to be used as a framework in order to discover the factors needed for developing MaaS as a service capability. In the next two parts, previous literature on how to develop service capabilities and how to develop MaaS is presented and added to this framework.

2.2 Service capabilities

To create a deeper understanding of service capabilities we will first start with defining the concept of service from the definition by Grönroos (2008 p. 52): “a process consisting of a series of more or less intangible activities that normally, however not necessarily always, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems”. With the use of service, firms can achieve a competitive advantage.

Service capability is a type of operational capability defined by Zhang and Chen (2006) as the ability to provide customized services during value co-creation with clients and thereby being able to differentiate their offerings from competitors. Further, co-creation is defined as the joint creation of value by the company and the customers (Prahalad & Ramaswamy, 2004). Lindblom (1979) identifies that a successful service strategy involves continuous modification and adaptability, to adapt to the changing market. To improve a service capability a firm can either develop an existing service or create services that they add to already existing products (Witell, Snyder, Gustafsson, Fombelle, & Kristensson, 2016; Payne, Frow & Storbacka, 2008). When a company successfully integrates service capabilities, it has a potential advantage over its competitors (Barney, 1991).

A classic form of service capability is servitization which has grown to be an important strategy for companies in order to create value for the company (Kindström & Kowalkowski, 2014). In the early 80s, firms saw a decrease in sales from products and began to look at the service component in their offer to find new streams of income (Wise & Baumgartner, 1999). Firms then started to add services to the product offers such as insurance and leasing to get new revenue streams. Vandermerwe and Rada (1988) were the first to mention the concept of 'servitization' as the process when adding additional services to the core product to create a higher perceived value. Ren and Gregory (2007) further defined servitization as the process where a manufacturing firm embraces service orientation in order to satisfy the customers and in return achieve competitive advantage. Ward and Graves's (2005) approach to servitization is similar, however, it is less extensive and focuses more on providing more services than the initial offer.

Kowalkowski, Gebauer, Kamp, and Parry (2017) explain servitization requires a significant change in the business model and the mission of the firm, where the service is the main source of growth since it requires that the organization goes from a product-centric approach to a service-centric approach. Adding services to the core offer has become an evident trend around the world. It is driven by the demand of consumers who want better solutions adapted to their needs, and it's a way for companies to create a competitive edge and generate new streams for revenues (Vandermerwe & Rada 1988; Baines, Lightfoot, Benedettini & Kay, 2009).

One newer form of servitization is, instead of just adding a service to a product, putting several services together in one service, also called bundling services together (Normann 2001). The concept of bundling can be described as selling products in a package, and/or offering a group of products or services as a package (Adams & Yellen, 1976, Guiltinana, 1987, Eppen, Hanso & Marin, 1991). With new technological solutions and a landscape more adaptable to change and new innovations, it is possible to combine different activities with new offers like this which makes it possible for organizations to generate new value. These types of offers provided by companies have, according to Normann and Ramirez (1993), become denser. Density is the measure of information, knowledge, and resources that the organization has to offer, which means that bundles are packed with more offers to create higher value. Companies must redesign their capabilities and relationships in order to keep their value-creating system up to date (Normann, 2001). They need to choose if they should reconfigure their business model or be reconfigured by the market Normann (2001) hence, be the ones that drive the change or the ones that follow the first mover. MaaS is an example of this kind of bundling since it requires several different transport services to be bundled together in an application. It is a way for transport companies to modernize their business to be contemporary.

This type of servitization where services are bundled into one service can thereby be seen as a development of a service capability since it contains knowledge, experience, and skills that companies invest in, develop and foster in order to create an edge over their competitors. As stated before, Leonard-Barton (1992) explains how a capability contains four dimensions, and how companies need to think about all of the dimensions when developing a capability. These four dimensions are utilized in the coming section to highlight prior research on what it takes for a service organization to create and operate and succeed with service capacity.

2.2.1 Knowledge and skills

When developing a service capability in a company, employees may be reluctant to change due to ambiguity in these changes. As a consequence, the lack of knowledge may create

misunderstandings and confusion for the employees (Pistoni & Songini, 2017). When a company shifts its initial strategy and works toward new objectives and activities besides its initial offer, there is a risk linked to failure due to the lack of knowledge, skills, and expertise within the company (Baines et al. 2009). Working with the development of a service capability necessitates a greater concentration on expertise among the employees that focus on the service aspects. Thus it requires new ways of thinking and acting, companies need to change how they operate and this includes the development of skills and knowledge within the organization. (Baines et al. 2009).

Firms need to invest in service-specific resources and capabilities to be able to deliver the service that the firm is developing (Peteraf, 1993). It is the role of managers to lead the firm in the right direction when implementing services, most firms are focused on their original product, thus many changes are required in the organization. In order to change the behavior in the organization, it is needed to potentially include new recruitment of new staff with the right knowledge or make changes in the organization that emphasizes the improvement of servitization, it is however important to also retain existing knowledgeable employees .

2.2.2 Technical systems

The services that a company provides have become more complex and varied, which also affects the ability to produce them, a single company rarely provides everything in their service. The most attractive offerings usually involve customers, suppliers, allies, and business partners (Normann, 2001). The use of technology, such as Artificial Intelligence (AI), big data, and Information and Communication Technology (ICT), is changing the behaviors and strategies of firms. It is transforming product design, manufacturing operations, and services (Paiola, Agostini, Grandinetti, & Nosella, 2022). The use of digital technology is referred to as digital servitization and is according to Kowalkowski, et al. (2017, p. 8) defined as “*the transformational processes whereby a company shifts from a product-centric to a service-centric business model and logic*”. The implementation of technology is changing the dynamics of the market and changing the interdependence between companies and creates new opportunities for value creation and revenue (Gartner, 2017). The shift towards more technology is pushing firms

to create or reformulate new business models that combine services and practices (Pirola, Boucher, Wiesner, & Pezzotta, 2020). With tougher competitiveness, companies are doing everything they can to provide their customer's cutting-edge service offers, and with the use of services, firms can compete in new means (Paschou, Rapaccini, Adrodegari, & Saccani, 2020).

With the use of data, it is possible for firms to get a better understanding of the customers, how they move, and how they behave. Thus, it is important to have a high-performance ICT system that enables data collection and analysis. With this information, firms can build a better understanding of their customer's processes and therefore enhance their offerings to the customer (Paiola, 2020).

2.2.3 Managerial systems

The intangible features and ambiguity of services make it hard for management to improve them. According to Zhang, Ye, Chen and Wang (2011), greater flexibility will aid in the development of a service capability. The transition to more service-oriented operations put pressure on the leadership of the firm and adapting to the new environment of service can create obstacles for the management team (Nie & Kosaka, 2014). To be able to commit to the service offer it is important for the management team to set a 'service vision' for the company that aligns with what they want to do (Olivia & Kallenberg, 2003). It is also crucial for senior management to commit to growing the service business, they should focus on activities that enhance the service, such as incentives, new capabilities, and goals that are in line with the transition into a service-focused company (Olivia & Kallenberg, 2003).

Producing services and products have become more complex and varied, and the relationship between parties that produce them has increased in complexity. A single company does not provide everything in their service, the most attractive offerings involve several parties, hence they involve customers and suppliers, allies, and business partners (Normann, 2001). This put a higher focus on greater partnership and collaboration between all the stakeholders, like manufacturers, service suppliers, and customers. Since services are complex and highly

customized, every stakeholder involved needs high knowledge of the customers and the whole offer (Pistoni & Songini, 2017). When developing the service it is according to Normann (2001) important to convince all the stakeholders that the service is of high importance and motivate the decisions of enhancing the service towards these stakeholders.

Transitioning into a service company may also create a need for organizational changes within the company. Windahl and Lakemond (2006) argue that isolating the part of the organization that works with service may be a critical success factor to be able to manage the transition. This is also highlighted by Olivia and Kallenberg (2003) who emphasize that it can be easier for the organization to start with service in a small area rather than doing everything at once.

2.2.4 Values and norms

Changing towards a more service-centric approach may have implications for the culture, and according to Pistoni and Songini (2017) the culture can be one of the biggest challenges when implementing and changing the strategy. This is because a more service-oriented approach differs, compared to manufacturing. As a result, the corporation must forego its old transactional approach in order to become more focused on service (Pistoni & Songini, 2017). Many firms fail with implementing a service adapted to the customer, due to the fact that they have not changed their organizational structure and relationships within the organization in relation to the direction outside (Gulati 2007). Working with soft factors such as service-oriented corporate culture, and human resources is according to Homburg Fassnacht and Guenther (2003) an effective way to facilitate a service approach within an organization. Brax (2005) also emphasizes how when implementing a service approach in a company, it is important to focus on adaptability since the way the implementation will carry out is ambiguous. It's therefore also important to implement new services step by step to avoid risks.

2.3 MaaS

Mobility as a Service (MaaS) is a term first coined by Heikkilä, (2014, pp 8) as “*a system in which a comprehensive range of mobility services are provided to customers by mobility operators*”. As the interest of the concept has grown, various definitions of MaaS have been formulated since then. The term has been described by Smith, Sochor and Karlsson (2018, pp 2) as “*an integrative concept that bundles different transport modalities into joint, seamless offerings, in order to provide tailored mobility solutions that cater to users' travel needs*”. An overall definition of MaaS would be to describe it as a platform that connects several transport providers both public and private, such as e-scooters, busses, subways, cars, bicycles, and walking, on the same platform with the purpose of providing multimodal trips that you can pay, plan and book for in the same app in a user-centric way (Kamargianni & Goulding, 2018; Butler, Yigitcanlar & Paz, 2021).

One of the main ideas behind MaaS is to give people a service that provides the benefits of convenience, reliability, and low cost in a way that makes people willing to give up their owned car as their preferred mode of transport. Car owners are therefore one of the main target groups for MaaS, together with current users of public transport who are looking to improve their mobility experience through better service (UITP, 2019). With the implementation of MaaS, cities can reduce negative social environmental, and economic externalities of car travel, thus reducing emissions, congestion, infrastructure demand, social exclusion, high transportation cost, and pollution (Butler, Yigitcanlar & Paz, 2021).

The system of MaaS is a complex system since it includes multimodal mobility, multiple stakeholders, and different objectives (Markard, Raven & Truffer, 2012). MaaS brings public and private companies together, forces them to work together, and in return, they can bring a seamless trip and payment system to the end customer (Heikkilä, 2014). In the MaaS ecosystem, a *MaaS provider* and the *transport operators* can be found (Reck et al., 2020). The MaaS provider is the one who provides the platform and enables transport operators to be on their platform. This role could be taken by a public transport authority, or by private companies. The provider is the intermediary between the user of the platform and the ones that provide the mobility solution (Smith, Sochor & Karlsson, 2018) The core business on the other hand is

formed by the multiple transport operators who trade their capacity to MaaS providers and provide access to their data and application programming interface (API) (UITP, 2019). This access allows MaaS providers to use that data in their application and thereby be able to offer customers a single digital interface for planning, booking, paying, and using transport (Kamargianni & Goulding, 2018). The concept of bundling is often used in the context of marketing terminology to increase the perceived value and maximize profit (Normann, 1999), however in the MaaS context the goal is rather to improve the sustainability (Kamargianni & Goulding, 2018). Thus, the objective for bundling is not profit maximization, it is to change the travel behavior of people to reduce the environmental impact (Reck et al., 2021).

As previously stated, Leonard-Barton (1992) explains how a capability contains four dimensions, and how companies need to think about all of the dimensions when developing a capability. Although there is no 'one size fits all' approach when implementing MaaS (Butler, Yigitcanlar & Paz, 2021), a limited amount of research has shown how to successfully develop the concept. Since we see MaaS as a capability, these four dimensions from Leonard-Barton (1992) are being used to present previous research on what is needed for a transport company to develop and succeed at MaaS.

Knowledge and skills

Intelligent transport (2019) describes how the skills required for the development of MaaS are currently considered lacking and that integrated education is considered key for the future of MaaS to develop. Further, Intelligent transport (2019) also states how the skill shortage is not easy to fix since the technology, databases, and levels of integration are evolving so quickly and the skills need to evolve with them.

Technical systems

Kamargianni and Goulding (2018) state how a crucial factor for the implementation of MaaS is the ICT infrastructure, which for example includes great internet access and a smart ticketing infrastructure. For MaaS to be successful, a wide range of transport data is also required, for example, available routes, vehicle position, speed, transfer time, and pricing (Kamargianni & Goulding, 2018). UITP (2019) further states the importance of using data and how analysis of

this type of data can provide valuable insight on how to adjust the MaaS service, for example by relocating stops or redefining certain routes, and thereby enhancing the overall service quality (UITP, 2019).

Managerial systems

UITP (2019) describes that MaaS requires a business ecosystem where multiple organizations act in collaboration, mixing traditional boundaries of business sectors and companies. It is crucial that all business partners in a MaaS solution are treated as equals and that the approach of the MaaS provider is non-discriminatory. Thereby, it is also important that the access conditions to join the MaaS platform is fair and that the information on the different transport services is presented neutrally (UITP, 2019). This is also confirmed by Smith, Sochor, and Karlsson (2018), who states that to create public value, the collaboration of public transport authorities with private actors will be necessary which will demand new organizational models, competencies, and processes.

Values and norms

A key factor for MaaS development is for companies to reduce the protectiveness, especially when it comes to their data. Kamargianni and Goulding (2018) state how a crucial factor for the implementation of MaaS is to what extent the different transport operators are willing to share their information. Similarly, Polydoropoulou, Pangoni, and Tsirimpa (2018) also highlight the importance of data sharing and state how that is a crucial process in order to avoid barriers related to the implementation of the service. Since data in many cases are seen as the new oil (Economist, 2017) there is a likelihood that companies will be reluctant to share data since it is one of their most valuable assets. UITP (2019) further describes how transport operators might feel reluctant to open their data to MaaS integrators due to concerns about losing their customer relationships. Community building and customer care are essential to the success of the service. Therefore, the transport operators need to have full trust that the MaaS provider will give a qualitative service to their clients. The fear of losing control and contact with the customer is thereby a barrier to building MaaS. In order to build trust, the integrator needs to find a way of enabling the transport providers to maintain their customer relations (UITP, 2019).

2.4 Concluding remarks and Preliminary framework

We have used Leonard-Barton's (1991) four dimensions that need to be considered while developing a capability and put in previous research on how to develop MaaS, which we consider a capability, into these dimensions. Due to the lack of literature when it comes to how to develop MaaS, literature on how to develop service capabilities were also added to the dimensions to create a better understanding. This resulted in a preliminary framework consisting of factors to consider when developing MaaS and service capabilities, as can be seen below.

With this model, we can conclude seven different themes of factors needed for companies to successfully develop MaaS which are: *need greater concentration on expertise among employees, need to recruit more staff with right knowledge, need to develop good technology, need good data, need for re-organization, need for good collaboration, need to stop having a perfectionist approach*. These led to the creation of an interview guide, as seen in Appendix A. Later, this framework is going to be discussed in relation to the findings in chapter four.

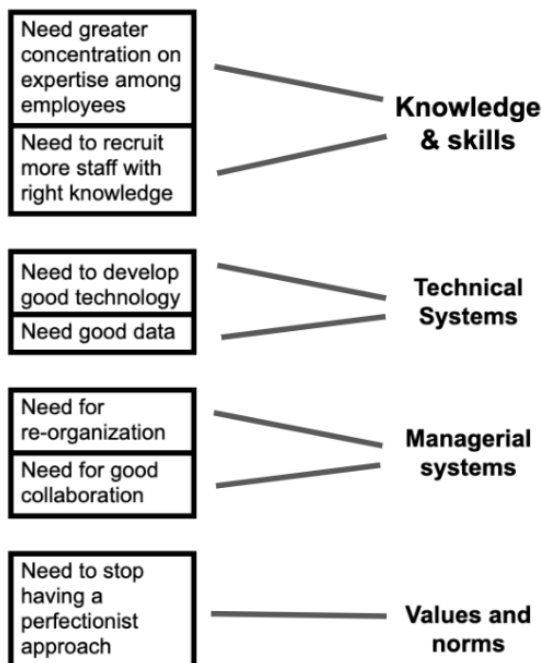


Figure 2: Preliminary framework (developed by researcher)

3. Methodology

The following chapter presents the methodology chosen to address the research question. First, the overall research approach and the design of the study is motivated. Subsequently, the method utilized for collecting data is explained, followed by a discussion about how the data was analyzed. Thereafter, a reflection of the validity and reliability of the study is provided, thus assessing the quality of the study. Finally, ethical considerations are explained.

3.1 Research Approach

Qualitative research will strengthen the underlying knowledge of social constructs by investigating the perceptions of participants and thereby let us reach a deeper understanding of how events and patterns unfold over time (Bryman Bell & Harley, 2022). We chose this approach to be fitting with regard to the purpose of the study since we want to understand how companies develop MaaS. Using a qualitative approach to our study, allows us to understand the complexity through analysis (Bryman, Bell & Harley, 2022). Moreover, a constructivist worldview was taken since the goal of this study was to rely as much as possible on participants' views of how to build MaaS as a capability. Thereby, the study could, instead of narrowing meanings into a few ideas and categories, capture the complexity of views (Creswell & Creswell, 2018).

Bryman, Bell, and Harley (2022) state that while conducting research there are two methodologies to select from; inductive and deductive methodology. Inductive methodology is suitable for exploratory work, however, it requires a clear definition of the target since the author want to construct the knowledge rather than taking it in passively. Interpreting interviewees' descriptions and translating them into items can be challenging, to make it work it is a necessity that the researcher has knowledge of methodological methods (Hinkin, 1998). A deductive approach is suitable when the research is uncertain about the dimensionality of the scale and contrast of interest (Tay & Jebb, 2017). An abductive approach is a mix of inductive and deductive procedures that incorporates interaction (Bryman, Bell & Harley, 2022). It seeks to overcome the constraints of inductive deductive approach

Dubois and Gadde (2002) argue that the abductive approach is suitable when the researcher intends to discover new things. We have in this study investigated how companies work with the development of a MaaS capability and therefore an abductive approach seems appropriate. It gave us the opportunity to discover new relationships between different theories, introduce new theories, and generate and modify existing theories (Saunders Lewis & Thornhill, 2019; Alvesson & Sköldbberg, 2017). With the use of the abductive approach, we got a holistic understanding of the topic and its related problems, since we went back and forth and alternated between data analysis and the literature. We were at the same time open to new ideas and insights, and the analysis and discussion could gradually emerge and evolve over time. The purpose of this study arose over time as the study progressed; as the purpose and framework evolved, the qualitative case study was built in accordance with these possibilities and limitations.

3.2 Research Design

The research design is, according to Saunders, Lewis and Thornhill (2009), the plan for how to link the purpose with the data and how it will be addressed. We first reviewed the literature about the previous research and looked into similar studies to find a gap within the literature. Creating the literature review helped us find the needed framework and pointed us in the right direction. According to Ravitch and Riggan (2016), case studies should begin with a literature review as a guide for reflecting on the purpose. Our study follows this approach. This design was used in our research to link the study from the initial investigation into our analysis and conclusions. A case study technique provides in-depth analysis of social processes (Bryman, Bell & Harley, 2022). Zach (2006) and Yin (2003) states that multiple case studies help the author to discover patterns and divergent themes. With the use of multiple case studies it is easier to capture the holistic view (Yin, 2003) and different companies can be compared and analyzed in order to find patterns that can contribute with insights to help understand our purpose.

3.3 Data Collection

The process of data collection started by exploring previous studies on capability development and the concept of MaaS, leading up to conducting interviews about factors needed for the development of MaaS. Thereby, the data used for this study included both secondary and primary data to provide a concrete insight into how companies develop MaaS as a capability.

3.3.1 Primary data

A common way of conducting primary data in a qualitative study is to interview participants and establish the meaning of phenomena from their viewpoint (Creswell & Creswell, 2018) which is also the method of collecting primary data that was chosen for this study since we want to have specific answers to our questions. Although questions were drafted beforehand, participants were also allowed to talk more about the aspects they found related in the context of their firms and experiences, which made the interviews semi-structured to discover new themes and interpretations that could evolve our paper (Easterby-Smith, Thorpe & Jackson, 2021). This structure gave us additional related topics to further investigate and examine their relevance in the field of MaaS development. The questions drafted beforehand can be seen in Appendix A.

3.3.2 Conducting interviews

The participants were contacted by initially making contact with various people working in the public transport sector who then got us contact information to people working with questions regarding MaaS in state-owned public transport companies. Bryman, Bell and Harley (2022) describe this as snowball sampling when the researcher makes initial contact with a small group of people who are relevant to the research topic and then uses these to establish contact with other participants. Since MaaS is a relatively new concept, the information available online on which people were working with MaaS in different companies was lacking. Therefore, snowball sampling was found to be the most appropriate one to get in contact with people with the most fitting knowledge. The problem with snowball sampling is that it is very unlikely that the sample will be representative of the entire population (Bryman, Bell & Harley 2022). Although, since the aim was to get in contact with people working with MaaS within state-owned public

transportation companies, and not get a view of an entire population, this was not considered a problem.

The participating companies were located in various places in Sweden and Norway which, due to the geographical distances, led to the interviews being held online. Doing interviews online was beneficial since we could eliminate time-consuming traveling to participating companies. One downside of doing online interviews can be the risk of technical difficulties occurring (Bryman, Bell & Harley, 2022) something we tried to mitigate prior to every interview by verifying the settings of the used platform. The participants were asked for their consent to be recorded during the interview, as well as their consent to use the provided information in the study. To not interfere with the respondents integrity we have anonymized the respondents by giving them fictitious names.

3.3.3 Respondents

The multiple case study includes seven firms within the Norwegian- and Swedish public transport sector. Their professions within transportation means they are all aware of the new, and so far underexplored, concept of MaaS. Their various positions and experiences enable different interpretations of how MaaS could be used and developed in their specific region to be highlighted. While some case-companies are at the forefront of the implementation of MaaS, others have just started to consider it. The different stages of development enable further differentiation in the answers and different types of insights, all available for a broad and generalizing analysis of the concept. Besides them being in different stages there is also a difference in how they will proceed with the implementation of MaaS. Some of the companies will own the whole chain while others are opening up for third parties to develop the service. However, the choice was made to solely focus on public transport companies and not other companies that might come to be participants in future MaaS-solutions. This is due to the fact that public transport companies are the frontrunners of these types of initiatives and can therefore provide the deepest and most substantiated arguments.

Table 1 List of respondents:

No	Respondent	Organization	Country	Date	Interview length
1	Marcus	Kolumbus	Norway	03.05.2022	56 min
2	Ernst	Värmlandstrafik	Sweden	03.05.2022	43 min
3	Martinus	Kolumbus	Norway	05.05.2022	27 min
4	Måns	Skånetrafiken	Sweden	05.05.2022	48 min
5	Petter	Ruter	Norway	05.05.2022	57 min
6	Carl-Gustav	SJ	Sweden	06.05.2022	52 min
7	Tore	Stockholms Lokaltrafik (SL)	Sweden	06.05.2022	50 min
8	Glenn	Västtrafik	Sweden	10.05.2022	57 min

3.3.4 Secondary data

Secondary data contain material that gives fast access to highly relevant information, and together with the primary data allow for better interpretation of the problem (Hox & Boeijs, 2005). The secondary data in this study included academic journals in the field of MaaS and capability development, as well as public transport companies' MaaS reports. These sources gave us perspective about how capabilities, service capabilities, and the concept of MaaS can be developed, which was later compared and contrasted with the findings from the interviews.

3.4 Data Analysis

The step-by-step approach provided by Creswell and Creswell (2018) has been used when analyzing the data since it provides a structure and a better overview of the collected data while

breaking it down to find patterns and themes, there are four steps to this.

The first step was to organize the data by transcribing and highlighting the most important parts connecting to the purpose. This was useful to not miss important information and to be able to interpret the material. With the use of our judgment and knowledge within the area, we decided what material was relevant and not which goes in line with Baileys (2008) who states that it is important to take interpretation, judgment, and representation to account when evaluating what material is relevant and not. We went through the transcribed material to make sure that we understood it in the same way and that we did not miss any details.

The second step is coding with the purpose of labeling and categorizing the data into different sub-divisions, where we based the sub-divisions on the dimensions in our preliminary framework. The coding was based on an iterative process, where new questions and insights came up when going through the material.

The third step is generating themes and detailed descriptions of the categories coded in order to connect the different statements to each other and to identify patterns from the interviews and the secondary data (Creswell & Creswell, 2018). With the use of our initial framework we could make sure that the result was in line with the purpose of the study, however, we were also looking for unexpected data to develop the framework. This step was the foundation for the themes in this study. The main purpose of doing this is according to Eisenhardt, (1989) to see distinct patterns. It is also convenient in exploratory research since it allows for more flexibility when linking the empirical pattern with a theoretical framework (Sinkovics, 2018). In the final step, the themes and interpretations were presented and compared to the findings from the theoretical literature, to make the data understandable in its context see figure 3 (Creswell & Creswell, 2018).

3.5 Research Quality

Reliability and validity is crucial in every study and should be considered when doing both quantitative and qualitative studies (Creswell & Creswell, 2018; Bryman, Bell & Harley, 2022; Yin, 2003). However, there are some criticisms against measuring validity and reliability in qualitative studies, Denscombe (2018) emphasizes that reliability and validity is not possible in qualitative studies since it's impossible to freeze time and room. Moreover, Guba and Licon (1994) emphasize that validity and reliability suit quantitative studies better and that it should be avoided in qualitative studies. The two concepts suggested by Guba and Licon (1994) have instead been covered in this study by trustworthiness and authenticity; Trustworthiness consists of the following concepts; *transferability*, *dependability*, *credibility*, and *confirmability* (Guba & Licon, 1994).

To enhance the *transferability*, the conducted research should be made according to best practices, being objective as researchers, and providing detailed descriptions of how the study was conducted (Guba & Licon, 1994). The use of qualitative design was decided upon and explained in the previous section. Since qualitative studies depend on interpretations it is arguable that there could be some doubts in the transferability. There is a risk that this type of study can be biased, to mitigate this and to increase the transferability into other contexts we have been as transparent as possible in regards to how the interviewees were conducted, how we reached out to our respondents, how the data was collected and how the data was analyzed. Being this transparent allows for replications of this study in the future (Geertz 1973).

In order to challenge our findings and our ideas we enhance the *dependability*. It was challenged throughout the work both via the peer-review at the mid-seminar, as well as during the regular check-ins with our supervisor. At the mid-seminar, we were not able to provide any data from the conducted interviews. Thus a third party did not validate nor scrutinize our transcription which may have affected the *dependability* negatively.

Credibility was achieved by sharing all the transcribed text with the respondent before writing the analysis. By being aware that objectivity in full scale is impossible to obtain, confirmability

was considered. Through the process of this study we have been aware of this and continuously reflecting and discussing how our preconceptions may have been shaped by the study. By knowingly engaging in theories and research with different views on capabilities and progressing abductively, In our pursuit of objectivity and transparency, we carefully evaluated measurements (Lincoln & Guba, 1994). Taking these criteria into consideration, we have done all possible to have as good validity and reliability in the study as possible even though it is qualitative research.

3.6 Ethical considerations

According to Creswell and Creswell (2018), ethics are especially important when doing research within the field of qualitative research. To avoid any problems concerning ethics and to avoid ambiguity we have been working with the three ethical principles provided by Bryman, Bell, and Harley (2022); (1) avoidance of harm, (2) informed consent, and (3) privacy.

To avoid harm we have throughout the interviewees made sure that the participants always felt comfortable. We made sure that respondents felt safe by letting them say no to answer certain questions such as personal information or inappropriate in terms of company secrets, and confidentiality. This to make sure that we did not put any pressure on the participants to avoid stressful situations or make them say anything that would impact their careers negatively.

Informed consent is according to Bryman, Bell och Harley (2022) when the interviewees have all the information about the project and how they will be involved and contribute to the study. We informed the participants about the scope of the study and how they would contribute both by email before the interview and at the beginning of each interviewee. We also offered the participants to go through the transcribed text afterward, to let them see if there was anything that they did not like to share.

Finally, privacy is concerned with the protection of the study participants (Bryman, Bell & Harley 2022). We made the decision to anonymize all the participants both to protect their

integrity and to make them feel comfortable saying whatever they want. However, the companies are state-owned and the company strategy is available to everyone so with the consent of the participants we have chosen to keep the company names in the study.

4. Empirical findings

The following chapter presents the findings that were collected through interviews of seven different companies within public transport. The findings will be the foundation for answering our research question about which factors public transport companies experience as crucial to successfully develop MaaS. The findings will be presented in the order of the aggregated dimensions followed by an updated version of the preliminary framework, complemented with the findings from the empirical research.

All of the organizations we have interviewed have different agendas when it comes to MaaS strategies, the major difference is the decisions if they plan to be the MaaS operator or the provider. Västtrafik and SL both wanted to open their APIs to let other companies develop MaaS platforms that they could join. All of the other companies are planning on implementing or have already implemented their own MaaS applications. Regardless of chosen strategy, the companies all had opinions on how to develop MaaS in the best way possible, and these empirical findings are here going to be presented by reference to aggregated dimensions in the preliminary framework.

4.1 Knowledge and skills

The data analysis revealed that the interviewees felt like in order to get the knowledge and skills to successfully develop a MaaS solution, the organizations need more knowledge about MaaS, they need more people in the organization that works with MaaS and they need to learn from different trials.

Need more MaaS knowledge - All of the interviewees expressed how increasing knowledge is crucial in order for the company to successfully implement or be a part of a MaaS solution. For example, Ernst stated that *“for sure there will be needed new competences to succeed at MaaS”*. Glenn further described how they have put consultants in the company to increase MaaS competence in the management team with the explanation that *“you need an increase in skills to*

understand what mechanisms you are playing with here since it's a relatively new area" and that with the use of consultants it is possible to get new knowledge within the area of MaaS and a new set of eyes on a complex problem. Glenn also added that these skills need to come from both the private and public sector to make the implementation of MaaS as good as possible, stating *"one must have the experience both from the public and private sector to understand the mechanisms both inside and outside this type of organization that we are working on"*. Måns on the other hand expressed that rather than only making efforts to create expert knowledge on MaaS within the organization, the most important factor in an early implementation stage is that the organization *"arouses curiosity about how MaaS can contribute even more to societal development in the sustainable society"*.

Need more people in the organization working with MaaS - Four interviewees, namely Carl-Gustav, Glenn, Tore and Petter indicated that there is a need to increase the amount of people working with MaaS in the organization for a more successful development. Carl-Gustav stated that *"we have people working with it but we are far too few"*. In this regard, Glenn noted that they have some experts, however they need general knowledge in the whole company stating that *"even though there are people like me here who have been doing this for a very long time and have quite a deep knowledge of MaaS, that does not mean that my company has it"*. Tore and Petter both had the opinion that the sector where most people are needed to successfully implement MaaS is within IT. Tore described that *"the tight sector is IT, so we need to hire more people there"*, Petter further explained that *"you must have a solid digital knowledge in the house, you almost have to be an IT company to run this, to make MaaS work, you need good in-house staff"*. However, Petter further emphasizes that competing within the area of IT-knowledge is hard and states that *"compared to the big companies like Google, it is impossible to compete within the technical aspects, our IT department is 100 people and they are so many more"*.

Need to learn from trials - Four interviewees, Måns, Glenn, Ernst and Tore, argued that the best way to get knowledge and skills about MaaS is from previous experiences. Tore stated that to get more knowledge about MaaS *"pilot projects are actually extremely effective, that you can actually test to get results"*. Måns had previously joined the market pilot MaaS in Skåne and

since many obstacles were identified in the pilot they made the decision to pause the engagement in the pilot with the explanation that *“we have chosen to enter a learning phase now where we share all insights and lessons we have learned so far in the project”*. Glenn further explained that it’s important to not only get knowledge from your own pilots, to get a boost in MaaS knowledge, it is necessary to also learn from other pilots. He stated that *“it is extremely important for our type of organization that you dare to look at how others have done...there are as many lessons about how to do as in how to not do”*. Ernst further believes in pilot testing on a small scale and states that *“we have pilot testing now with what we call dynamic public transport where we are testing new solutions in municipalities in the countryside”*. They believe in not taking huge risks and by doing smaller pilot projects it makes it possible for them to see if MaaS would be feasible on a bigger scale.

4.2 Technical systems

To be able to develop a MaaS solution, the data analysis revealed the importance of developing the internal technology, as well as making sure to have access to good data.

Need to develop the technology - All of the interviewees felt like development of technology was a crucial part of making MaaS work and many of them feel like not having the right technology is slowing down the development process of MaaS. Tore stated how *“we actually still have quite a lot to do about the new ticket system, there is a small backlog with IT on the IT side...it is the IT department that is currently slowing it down”*. Glenn was actually about to open up for others to sell their tickets in a MaaS solution over two years ago, however due to lack of system support, they had to wait and update their financial system. Glenn explained how *“there were plenty of shortcomings in our own systems. We did not even have automatic invoicing, we did not have support for this in our digital platforms. There were a number of different things that made us realize that we were not equipped for someone else to be able to sell our tickets”*. Måns had a similar experience stating that *“when we started working with this then we saw a lot of obstacles, for example in the form of technology and what our technology could offer”*. Måns

also described how a good MaaS application is one of the most important technologies to develop when becoming a MaaS provider stating *“the app is the first thing you think of, it’s like where they find the offer and then we need to make the alternatives that exist visible...if we can not make offers visible, it does not matter how cool the things we do are”*. Similarly, Carl-Gustav reflected that *“we need a flexible booking platform that can handle all different types of traffic and additional trips and variants”*. Petter, on the other hand, had a strategy that said that they are an IT company and have invested a lot of resources in IT. Their advice for success with MaaS is to *“buy ready-made technology rather than developing it yourself, preferably many organizations should procure the same app so that MaaS works the same in several geographic locations”*.

Need to get access to data - Måns, Petter and Carl-Gustav also stated the relevance of, if the company is planning to be a MaaS provider, being able to get access to the data from the transport operators. Måns described how they need customer information in order to know where people move and where the changes usually take place. Similarly, Petter stated how *“you have to get a grip on the customer data, it does not have to be at the individual level at all, but it must be in clusters that makes us see how people move in the city...for example how they move, how they walk, how they sit in cars, how they ride scooters”*. Carl-Gustav talked more about the data required from the operators stating that they need *“their booking data and data about their product range so that we can integrate it into our channel without it getting messy”*.

4.3 Managerial systems

The data analysis also revealed how there is a need for good collaboration among the parties, a need for re-organization and a need for making MaaS a priority, in order to develop MaaS in the best possible way.

Need for good collaboration - Glenn, Carl-Gustav, Petter and Tore described how, in order for MaaS to work out, the companies involved in the MaaS solution need to have a good collaboration with each other. Carl-Gustav described how they *“need to establish collaborations with a number of operators and then you need to be good at developing and maintaining those*

agreements". Glenn explained how the key to a MaaS success is to have very open agreements among all the companies involved saying it's important to give *"100% exactly the same conditions, a standard agreement, it will then be simpler and clearer conditions for all parties"*. Similarly, Tore described how in order to work best with MaaS, it is important to have an open dialogue between all parties. Petter also stated that it is good to have knowledge within procurement and negotiations to work with MaaS and highlighted that SL is a really good example of this. Glenn also stated the importance of being transparent among each other stating that *"you have to be incredibly transparent with each other with what you want and so on for MaaS to work for everyone"*.

Need for re-organization - Four of the interviewees, Glenn, Måns, Petter and Carl-Gustav expressed how there is a need for re-organization in the company to make MaaS work better. Glenn stated that *"if we are going to work with MaaS, we need to reorganize"*. Måns highlighted the importance of working cross-functionally stating that *"we would have needed to involve more hands, resources, brains and skills and work more cross-functionally in this"*. On the other hand, Petter thought that in order to work with MaaS, you may have to separate it and have a special department in the organization dedicated to MaaS. Carl-Gustav further speculated on that idea and said that one thought is if it would be necessary for the future to divide the organization into one part that develops the MaaS channel and one part that is driving the trains.

MaaS needs to be prioritized - Glenn, Måns, Petter and Carl-Gustav highlighted that MaaS needs to be treated as a priority from the management in order for the company to successfully develop a MaaS solution. Måns was speaking from personal experience and explained how the reason that MaaS has not worked out as good for them is because *"it has not had the priority it should have in order to be successful"* and that it is therefore important that MaaS comes up on the agenda. He further described how short-term issues often get prioritized stating that *"it's just that there's so much else that grabs attention and it's usually associated with what's happening today or tomorrow"*. Petter explained this common situation as problematic stating that *"it is important to have a clear strategy that works both long-term and short-term"*. In order for MaaS to get prioritized, the interviewees described how it is important that the whole team is on board. Måns explained how *"if we are to make such investments, it must be a concern of the entire"*

management team, not just the director but the whole team. Then we will get the opportunity to be allocated necessary resources, and also that MaaS comes up on the agenda". Similarly, Glenn stated how *"the most important thing to succeed with this type of solution is to make sure that you have the entire management with you. If you do not have that, it will be extremely difficult to work with it"*. Carl-Gustav explained it as *"it takes commitment, for us to get there, to establish that this is the strategic direction"*. Måns further explained how it is not only about the management team, the whole company needs to be committed to MaaS for it to work out. He gives an example of that a problem for MaaS development could be if the finance department for example feel like it's not their job to *"play bank for a scooter company"*.

4.4 Values and norms

To be able to successfully develop MaaS, the data analysis revealed how the organizations have the opinions that you need to change your values and norms in order to stop having a protectionist approach, to get an innovative mindset, and get the courage to try.

Need to stop having a protectionist approach - Tore and Glenn both had the strategy to open up their APIs and thereby let other MaaS providers sell their tickets, instead of developing a MaaS solution themselves. They also both had the opinion that to succeed at MaaS means that the company needs to stop having a protectionist approach. Tore, representative for SL, describes that some within the organization are hesitant towards letting third party providers sell their tickets with the argument that SL would lose control over the tickets *"the culture needs to change in order for the company to get used to being involved in multiple contexts where they do not always meet the end customer"*. Glenn similarly explained how *"we have a purpose to ensure that people can move, and now when there are MaaS services created one must therefore dare to let go of the protectionist approach...the only way to succeed is to not be protectionist about your own part in the big crowd, it's all about sharing"*.

Need an innovative mindset - Three of the interviewees, Måns, Marcus and Ernst, mentioned how there is a need to switch to a more innovative mindset when developing a MaaS solution.

Måns described when developing MaaS they need to “*break away from the old way of thinking*” about public transport, that public transport also can be bikes for example and not only buses and trains. Similarly, Marcus stated how “*it is important to root not only for selling more bus tickets, we must also root for all the other options. In the old world, we only rooted for people to take the bus, but now it’s just a matter of reducing car use, everything but a car is thumbs up*”. Måns also described how they in the past have thought about the journey as “*the movement from point A to point B*” now they need to think that with a MaaS offering “*we can contribute so much more than just offering the world’s best trip*” for example. Ernst on the other hand relies heavily on that it is their bus operators that need to develop new services stating that “*they understand that they have to evolve quite a lot to be relevant in the future. They have to offer other services than just drivers and buses as they do today.*”.

Need the courage to try - Måns, Glenn, Martinus and Ernst expressed the importance that the organization has the courage to try when it comes to MaaS. Glenn described how, in order to succeed with MaaS, it is all about to “*just let go of the railing, dare to let go*”. Martinus expressed how you need to “*dare in order to succeed*” and that they have a culture that allows people to fail. Måns on the other hand described how they have not yet dared to try to make MaaS happen even if they want to, stating that “*we want to dare to try, but I feel like we have not had the ability or the courage to really do so*”. Further, Måns explained how all their stakeholders, for example municipalities, cities and mobility suppliers, have an expectation on them to decide which kind of position to take in MaaS so that they then can act accordingly. He explained how the stakeholders ask “*are you going to sit in the driver’s seat and drive this issue or will you sit in the back seat and let the market take care of it and you will only assist with knowledge, buses and trains...the stakeholders hardly dare to invest until they know how we think, because if we think differently than how they think we think it can be costly*”. He then concluded that it therefore feels like they are inhibiting the development linked to MaaS by not taking a stand and daring to try.

4.5 Revised framework

With the foundation in our preliminary framework, we have after our empirical findings created a revised framework on factors public transport companies experience is crucial in order to successfully develop MaaS. Data analysis resulted in eleven different factors, or themes, being identified which is the foundation of the revised framework presented below. This revised framework is further going to be discussed and explained in the next chapter, where a comparison to the preliminary framework also is going to be made.

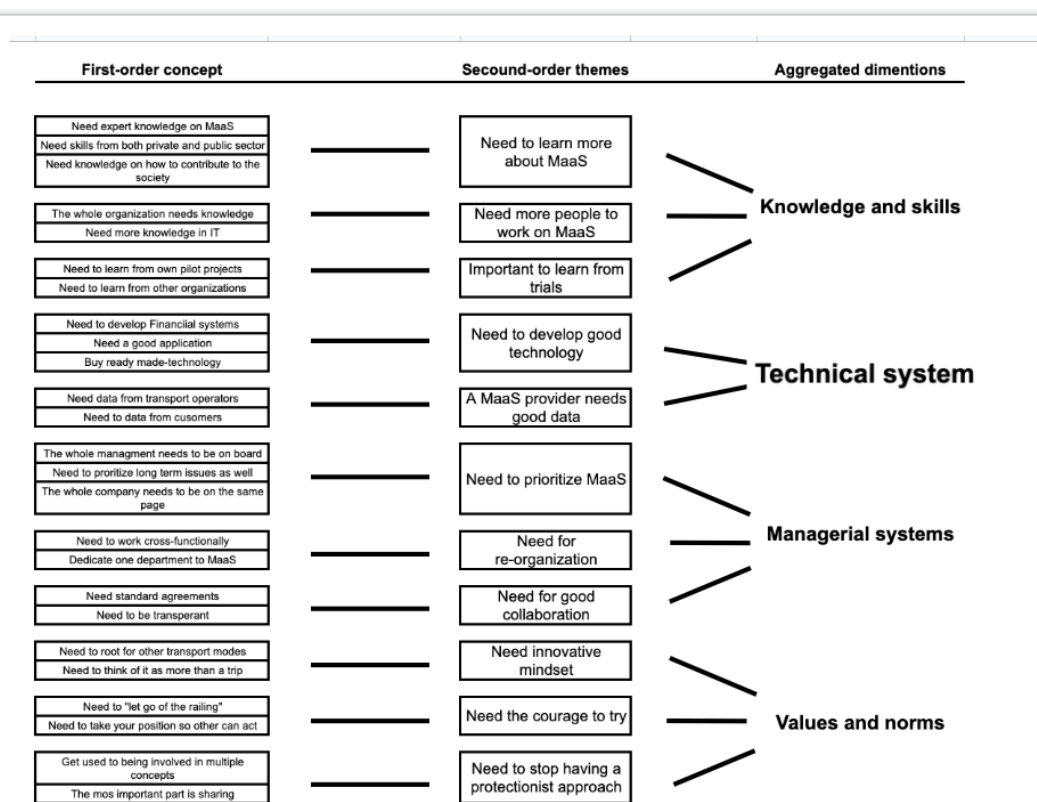


Figure 3: Revised framework, How to develop a Maas capability (Developed by researcher)

5. Discussion

Building on the empirical results, this chapter aims to address the research question of the study by discussing the findings and comparing the fit to previous research.

The preliminary framework of the study presented research on what is needed for development of service capabilities and MaaS grouped into the four dimensions, all important to think about when developing capabilities, presented by Leonard-Barton (1992): knowledge and skills, technical systems, managerial systems and values and norms.

As concluded in the revised framework, the findings then revealed eleven different themes, or factors, that were considered important in order to develop MaaS successfully. These factors are: *the need to learn more about MaaS, the need for more people to work on MaaS, the importance to learn from trials, the need to develop good technology, the need for good data, the need for good collaboration, the need for re-organization, the need to prioritize MaaS, the need to stop having a protectionist approach, the need for an innovative mindset and the need for courage to try.*

All of these eleven themes, or factors, were further grouped into the same four dimensions presented by Leonard-Barton (1992) to complete the revised framework. Since the framework of Leonard-Barton (1992) covered all the found themes there was no need to change the aggregated dimensions. The eleven found themes from the revised framework will hereby be discussed, divided into the same dimensions, to provide an understanding for how the findings complement the previous research on the topic.

5.1 Knowledge and skills

The first insight derived from the findings within knowledge and skills can be summarized by saying that companies working with MaaS need to learn a lot more about MaaS in order to be successful. The findings show several ways the companies experience that expert knowledge, both from the private and public sector, is required in order to develop MaaS. Such findings imply what Baines et al. (2009) discuss when stating that working with the development of a service capability requires a greater concentration on expertise among the employees. When talking about the knowledge and skills required for the development of MaaS, previous literature mainly emphasizes this need for expert knowledge. The findings of this research support this, however they also emphasize the importance that the first kind of knowledge the company needs when developing MaaS is not only expert knowledge on MaaS, it's also knowledge in the company on why MaaS is important to invest in for the future. Many companies experienced how there is a need to convince the employees why MaaS is a good way to go, by teaching them how MaaS can contribute to societal development before the company invests in the development of MaaS expert knowledge.

The findings also suggest that in order to develop MaaS successfully, there needs to be a recruitment of people working with MaaS in the companies. The findings are thus aligned with Pistoni och Songini (2017) discussion about the need for recruitment of new staff when there is a change in an organization. The MaaS literature also emphasizes the importance of IT skills by Intelligent Transport (2019) stating how the MaaS skills required need to evolve with the quick evolution of technology. The findings from this research support this by determining that to develop MaaS successfully, the most crucial sector needs the recruitment of people in the IT department. However, while previous research is mainly focusing on the importance of recruiting IT staff for the development of MaaS, an additional finding is the importance of the whole organization needing to have knowledge about MaaS, not only a few people sitting on expert knowledge at an IT department. Also, investing in IT-knowledge and hiring IT-staff is expensive, especially when firms need to compete with Big Tech. It could however be an incentive for the companies to offer the employees education within IT which could potentially motivate them to

stay within the company longer and foster more of an IT-culture in the company. This goes in line with Pistoni and Songini (2017) who highlight the importance of retaining personnel to improve servitization.

Previous research on skills and knowledge needed when developing MaaS mainly emphasizes what kind of knowledge is needed, not where to get it from. However, the findings showed how many of the interviewees stated the importance of learning from MaaS trials. It was stated multiple times by the interviewed companies that the best way to get knowledge and skills about MaaS is to learn from previous experience, both from internal pilot projects and from other companies' trials. In some cases, the companies had even chosen to put the whole development of a MaaS solution on pause because they felt the need to share all insights and lessons they had learned so far. Hence, the importance of learning from trials was added to the revised framework to account for this broader view, complementing the existing focus.

5.2 Technical systems

All of the interviewees argued that the development of technology is a crucial part of making MaaS work. Such findings imply what Paiola (2020) discusses as that, when developing a service capability, it is important to have a high-performance ICT system in place to enhance the offer to the customer. Another insight derived from the findings is that one of the main factors for the successful development of MaaS is to get the new ticket and financial system to work. The findings are thus aligned with Kamargianni and Goulding (2018) discussion about how a crucial factor in the ICT infrastructure when developing MaaS is a smart ticketing infrastructure. Complementing previous research, the findings also showed how a MaaS application that is easy for customers to understand is one of the most important technologies to develop when becoming a MaaS provider and crucial in making the MaaS offer visible. Previous research on technical systems needed to develop MaaS mainly emphasizes what kind of technology is needed, however, the findings are also stating that how to develop the technology is a crucial part in making a MaaS development successful. An insight derived from the findings is that a success factor can be to buy ready-made technology rather than the company developing it themselves.

In that way, several companies can also procure the same application, making the experience easier for customers using MaaS applications in different regions.

The findings also show that if a company is becoming a MaaS provider, it needs access to good data. Many of the interviewees argued for the importance of great customer information in order to know how and where people move and where changes in transport modes usually take place. Such findings align with the literature arguing for the importance of using data and how analysis of this type of data can provide valuable insight on how to adjust MaaS, for example by relocating stops or redefining certain routes, and thereby enhancing the overall service quality (UITP, 2019). The findings also highlight the importance of data from the different transport operators stating that in order to become a MaaS provider they need the transport operators' booking data and data about their product range to integrate into their systems. Such findings imply what Kamargianni and Goulding (2018) discuss as the wide range of transport operators' data that is required, for example, available routes, vehicle position, speed, transfer time, and pricing, for a MaaS application to be successful.

5.3 Managerial systems

Many interviewees also argued that, in order for MaaS to work out, the companies involved in the MaaS solution need to have a good collaboration with each other. Such findings align with the literature arguing that to create public value within MaaS, collaboration between public transport authorities and private actors is necessary (Smith, Sochor & Karlsson, 2018). The findings further explained how the companies need to be good at developing and maintaining the agreements between all the parties, where a key factor is having very open standardized agreements to maintain simple and clear conditions for all parties. These findings imply what UITP (2019) discuss as that it is crucial that all business partners in a MaaS solution is treated as equals and that the approach of the MaaS provider is non-discriminatory, fair, and neutral.

The findings on managerial systems needed to develop MaaS determine that the companies feel like there is a need for re-organization in the company to make MaaS work better. Windahl and Lakemond (2006) argue that isolating the part of the organization that works with the service, when servitizing a new business, may be a critical success factor to be able to manage the transition. The findings in this research support this by stating how you may have to separate the organization by having a special department in the organization working with MaaS in order for the company to succeed at the service. However, there was a paradox identified in the findings since some of the companies instead were stating how there is a need to work on MaaS cross-functionally, thereby not dividing the organization into a special MaaS department. This cross-functional re-organization was not identified in the previous literature on the subject.

The analysis of the findings further revealed the need for MaaS to be prioritized by the company in order to be able to successfully develop it. The majority of the interviewees highlighted how MaaS needs to be treated as a priority by the whole management team for the company to be able to allocate necessary resources. It was also indicated by the findings how the whole company needs to be committed to MaaS for it to work out, not only the management team. The findings showed how a lack of a long-term focus in the company, such as the development of MaaS, inhibits the company's success. This makes it crucial to prioritize long-term issues, such as MaaS, in order for the company to succeed with a MaaS development. This factor on the importance to prioritize MaaS is not touched upon in the previous literature on managerial systems needed for MaaS development and was thereby added to the framework to account for this broader view, complementing the existing focus.

One thing to take into account when the public transport providers work with the development of MaaS is that the objective is twofold. On the one hand, they want to act quick and responsive short-term to be up to date with the latest innovations. On the other hand, the companies have a long-term social responsibility towards the citizens that requires well thought through decisions for future investment. This long-term objective makes it harder for the companies to act fast and invest short-term. The Norwegian companies, however, have better support from the government to act in a more trial and error approach when investing for the future. We can also see indications that Västtrafik is going in the same direction since, just as the Norwegian companies,

they are not directly connected with the municipality. This makes them more quick-footed, although it also makes them dare to invest in things that may not last in the long run.

5.4 Values and norms

When it comes to values and norms, the findings show how the companies with the strategies to open up their APIs and thereby let other MaaS providers sell their tickets all had the opinion that to succeed at MaaS means that the company needs to stop having a protectionist approach. They show how the key to MaaS's success is sharing and not being protectionistic about your own part in the big crowd. Such findings imply what Kamargianni and Goulding (2018) discuss as that a crucial factor for the implementation of MaaS is to what extent the different transport operators are willing to share their information. It similarly goes in line with how Polydoropoulou, Pangoni, and Tsirimpa (2018) highlight the importance of data sharing and how that is a crucial process in order to avoid barriers related to the implementation of the service.

Another insight derived from the findings, that was not brought up in the previous literature, was the need for an innovative mindset in order to successfully implement MaaS. The majority of the interviewees expressed how there is a need to break away from the old way of thinking about public transport and that the whole company needs to have the mindset that public transport also can be about other modes of transport than for example buses and trains. The findings further showed how in order for MaaS to succeed the company needs to root for all transport options and also think about the MaaS offer as more than just a trip. It is not just about getting people from point A to point B, MaaS can change people's quality of life and help save the planet, which is the kind of broader mindset companies need to have in order to implement MaaS successfully. This need for an innovative mindset in order to develop MaaS was therefore added as an additional theme to the framework.

The findings also show how a company developing MaaS needs the courage to try, which was not something that was touched upon in previous research either. The majority of the

interviewees argued that when it comes to MaaS, the company needs to have the courage to try and dare to let go of the railing in order to succeed. The interviewed companies brought up many different examples of when they felt like they were inhibiting the development linked to MaaS by not taking a stand and daring to try, which strongly indicates the importance of having the courage to try. This need for courage to try in order to develop MaaS was therefore also added as an additional theme to the framework.

5.5 Concluding remarks

As concluded in the revised framework, the findings revealed eleven different themes, or factors, that were considered important in order to develop MaaS successfully: *the need to learn more about MaaS, the need for more people to work on MaaS, the importance to learn from trials, the need to develop good technology, the need for good data, the need for good collaboration, the need for re-organization, the need to prioritize MaaS, the need to stop having a protectionist approach, the need for an innovative mindset and the need for courage to try.*

Three of the identified factors from the findings confirmed the previous literature on the topic, *the need for access to good data, the need for good collaboration, and the need to stop having a protectionist approach* in the company. Further, four of the identified factors from the findings partly confirmed previous literature but added some kind of extra dimension to the research:

The findings confirmed previous literature on the *need to learn more about MaaS* since the previous research stated the relevance of expert knowledge. However, the findings additionally showed the importance of educating employees about why MaaS is important for the company to invest in for the future. Further, the findings also confirmed the previous literature on the *need for more people to work on MaaS*, especially within the IT department. However, the findings emphasized the importance of the whole organization needing to have knowledge about MaaS, not only within the IT department.

The findings also confirmed the previous literature on the importance of *developing good technology* for successful MaaS development, especially a good ticket and financial system. The findings, however, additionally showed the importance of developing a MaaS application that is easy for customers to understand, and also that the easiest for the customers would be if many MaaS providers come together and buy ready-made technology instead of developing it themselves. The findings further confirmed the previous literature on the *need for re-organization* when developing MaaS when it comes to separating the organization into a special MaaS department. However, there was a paradox identified in the findings since some of the companies instead were stating how there is a need to work on MaaS cross-functionally which was not identified in the previous literature on the subject.

The findings further revealed how four of the factors - *the importance to learn from trials*, *the need to prioritize MaaS*, *the need for an innovative mindset*, and *the need for courage to try* - were crucial for the development of MaaS, however, it was not highlighted in any previous research on the topic. The preliminary framework was thereby expanded with these four themes to account for this broader view and complement the existing focus. These four factors are considered the main theoretical implications of the findings as they add to the previous literature and are going to further be discussed in the next chapter.

6. Conclusion

The purpose of this study was to increase the understanding of how companies develop MaaS as a capability. To do so, the following research question was formulated:

Which factors do public transport companies experience as crucial in order to successfully develop MaaS?

To answer the research question, a multiple case study of seven different public transport companies in Sweden and Norway was conducted. Based on the previously discussed findings, this study argues that there are eleven different factors public transport companies consider important to develop MaaS successfully. The eleven factors, also shown in the revised framework, are: *the need to learn more about MaaS, the need for more people to work on MaaS, the importance to learn from trials, the need to develop good technology, the need for good data, the need for good collaboration, the need for re-organization, the need to prioritize MaaS, the need to stop having a protectionist approach, the need for an innovative mindset and the need for courage to try.*

Out of these factors, four of them were not discovered in previous research and were therefore added to the revised framework. These four factors are thereby considered the main theoretical implications of the study as they add to the previous literature. The first one is the importance of *learning from trials* which highlight that doing internal MaaS pilot projects, and also learning from other companies' MaaS trials, is crucial for the learning and development of MaaS. The second factor is the importance of MaaS being *prioritized*, both by the management team and the whole organization, for successful development. The third one is the importance of having an *innovative mindset* in the company to be able to break away from the old way of thinking about public transport in order to succeed at MaaS. The fourth added factor is the importance of having the *courage to try* new things in the company and dare to let go of the railing for successful development of MaaS.

A common thread among all of the four added factors is how they all have something to do about mindset in one way or another. The previous research on how to develop MaaS is more focused on what kind of practical conditions are needed for MaaS, like the need for good technology, good data, re-organization, or new recruitment. The added factors in our framework complement this previous research by adding the importance of what kind of mindset the company needs in order to use those conditions in a successful way. These theoretical implications complement the existing theoretical focus by highlighting the importance of being open to new things, having the courage to prioritize and try these new things, and learning from the trials that are being made. Without this kind of mindset, MaaS development is often being inhibited, despite the fact that the company has most of the other conditions in place for MaaS, something many of the interviewees clearly expressed. These findings are thereby considered an important addition to the current research on how to develop MaaS as a capability and even how to develop capabilities overall.

6.1 Practical implications

This study allows public transport companies to understand which factors are crucial in order to successfully develop MaaS. The factors in our framework can be used by the public transport companies as a guideline to which steps need to be taken and likewise aid project leaders for MaaS to get an idea of what kind of resources they need to make MaaS successful. Not only public transport companies would benefit from this study, but all the different actors in a MaaS solution would also benefit from knowing what factors are crucial for a successful MaaS development since they all need to be involved in order for MaaS to work. Therefore, this can help other actors as well, like car rentals or scooter companies, to get the knowledge they need to successfully develop a MaaS solution.

6.2 Limitations and further research

This research has been subject to several implications, most of which are connected to our choice of method and especially in regards to the data collection, both in terms of the size of the interviews, their location, and their position in the MaaS ecosystem.

We have in this study only focused on public transport companies and their relation to the development of MaaS. All of the chosen companies are connected to the government and municipality in one way or another, they are government-funded, and can therefore not disrupt the market of MaaS in the same way as a private company can. Their primary focus is not to make the most out of MaaS, but rather to provide modes of transportation to the people in the city. To get a deeper insight into how firms best develop MaaS it would have been insightful for further research to contact private companies to understand their process of developing MaaS and what factors help them succeed. It is possible to argue that they have more practical knowledge within the area of MaaS since they are working closely with the market of MaaS, and are more of an IT company rather than a transport provider, thus they have the resources and capabilities to develop technical services. Making a comparison between the different actors in the MaaS ecosystem would also have been insightful for future research, including scooter providers, car rental companies, and companies making payment solutions for example.

Furthermore, because MaaS is a relatively new concept that has only recently gained significant attention, it is possible that the respondents did not have enough experience with the concept of MaaS yet which could possibly have led to insufficient data. The market of MaaS is also disruptive and is changing fast in terms of new technology, laws, and regulations and there is a risk that our findings will not be applicable in the near future. Therefore, it would be of interest for future research to make the same study in a couple of years when there have been more MaaS trials out on the market, to see if the perceptions of success factors have changed.

Moreover, due to our limited scope of only focusing on companies in Sweden and Norway, it is hard to know if our findings are applicable in any other country. For further research, it would

therefore be beneficial to look at MaaS development in other countries for a more holistic picture. On a similar note, the small number of interviewees constitutes another weakness of this study. In the majority of cases, only one expert from each of the companies was interviewed and the number of studied companies was also limited. Future research might undertake a more complete analysis with more companies involved and several employees interviewed per each company to assure more representative findings.

Appendix A

Interview guide

- Tell us about yourself and what your position is.
- How are you working with MaaS right now and how are you planning on developing the concept in the future?
- What is needed internally in the company in order to succeed at MaaS?

Employee knowledge and skills:

- What kind of special knowledge and skills is required for employees working with MaaS?
- What kind of employee training is required internally when developing MaaS?

Technical systems:

- What kind of internal technology needs to be developed for MaaS?
- What kind of data is required to develop MaaS in the best way possible?
- How can you best get the transport operators to dare to share their data?

Managerial systems:

- How does the management of the company create the right conditions for the company to be able to succeed with MaaS? What kind of support is required from the management?
- How does the organizational structure need to change for MaaS?
- How can the many different organizations and actors in a MaaS solution best cooperate with each other?

Values and norms:

- What kind of values and norms is required in a company in order to succeed at MaaS?
- How does the culture need to change in order to work well with MaaS?

- Is there anything else that we have not touched upon that is important in the company internally in order to make MaaS work as good as possible?

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