

THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Exploring construction challenges of the public client: a dynamic capabilities approach

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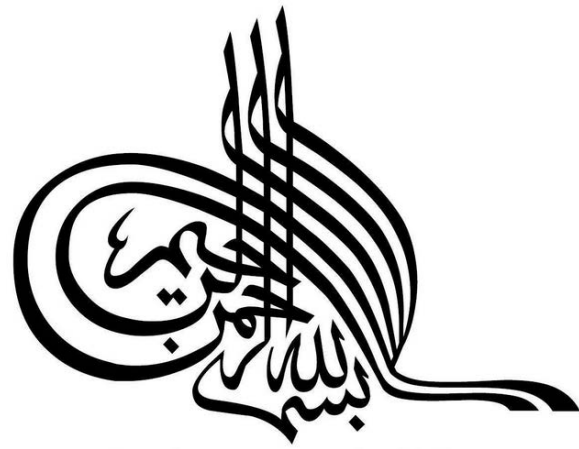
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Abstract

Construction clients in the public sector face a large number of challenges in designing, procuring and managing construction projects in a manner that is conducive to the organization's overall goals. In particular, clients have faced challenges in delivering projects that satisfied the projects' goals with respect to cost and time overruns. The role of the client in managing these challenges has more recently been emphasized, with a growing number of studies and governmental reports calling for the development of the client's capabilities with respect to delivering projects.

This thesis examines the capabilities of the construction client with respect to the dynamic capabilities concept. The two research questions that guided this research are, RQ1: What are the underlying mechanisms of dynamic capabilities? and RQ2: How can dynamic capabilities be understood and used by public clients to address construction-specific challenges? The viability of the dynamic capabilities approach is also discussed, particularly with respect to construction-related challenges faced by the client, focusing on the aforementioned cost and time overruns.

The main beneficiaries of this thesis, to which the contributions of the thesis are most relevant, are construction client organizations that operate in the public sphere. Most notably, the type of clients that are targeted are those that undertake the commissioning and managing of construction projects that require organizations that possess the capabilities needed to deliver cost and time efficient projects. Objectives crucial to all projects but especially to publicly funded and publicly scrutinized projects. The secondary beneficiaries of this thesis are researchers who study and develop the dynamic capabilities concept, a concept which has constituted the theoretical frame of reference that has been used in this thesis.

The thesis is based primarily on a case study of a large public construction client located in Sweden (PubClient) and a study of an association made up of 16 client organizations/divisions from the Swedish counties. Findings are presented in four appended papers. The thesis concludes with a discussion on the viability of using a dynamic capabilities framework in the specific cases described in this thesis and what implications this have for practice and further research.

It is argued that the concept of dynamic capabilities needs to be contextualized to capture the specific environment in which public client organizations operate. Suggestions for alternative approaches to understanding the management and development of capabilities are then discussed. Findings indicate the need for a segmented approach for understanding how dynamic capabilities are managed in client organizations, based not only on the level of stability in the environment but also taking into account the resources that are utilized. The thesis explores alternative frameworks of dynamic capabilities, beginning with the general framework proposed by Teece et al. (1997) which examined the activities of dynamic capabilities, and Zollo and Winter (2002) that examined the learning mechanisms of dynamic capabilities.

Additionally, more recent frameworks of dynamic capabilities that are tailored to the context of the construction client are explored, particularly, Davies and Brady (2016) who introduced the concept of 'project capabilities' to conceptualize dynamic capabilities in a project-based context. It is further argued that there is a need for a more granular research approach for studying the development of dynamic capabilities in a case-based setting. This would imply an approach that more specifically links the development of dynamic capabilities with the precise antecedent actions that preceded them, or, put more straightforward, which action in an organization develop which specific dynamic capability.

Keywords: client organization, construction industry, capabilities, dynamic capabilities, construction challenges, case study

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In the name of God, Most Gracious, Most Merciful, all thanks and praise is due to God.

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Med vänlig hälsning,
Abderisak Adam
Gothenburg, Sweden

Appended papers

The following papers have been appended to this thesis.

Paper I

Adam, A., Josephson, P.E.B and Lindahl, G. (2017). Aggregation of factors causing cost overruns and time delays in large public construction projects: Trends and implications. *Engineering, Construction and Architectural Management*, 24(3), pp.393-406. [Published]

Paper II

Adam, A. Methods for managing cost and time overruns in light of the dynamic capabilities concept. *Engineering, Construction and Architectural Management*. [Accepted for publication / review process]

Paper III

Adam, A and Lindahl, G. (2017). Applying the dynamic capabilities framework in the case of a large public construction client. *Construction Management and Economics*. 35(7), pp. 420-431. [Published]

Paper IV

Adam, A., Lindahl, G., Leiringer, R. (2019). The dynamic capabilities of public construction clients in the healthcare sector. *International Journal of Managing Projects in Business*. [Accepted for publication / In Press]

Distribution of work

This section outlines the distribution of work for the appended research papers.

Paper I:

Adam is the first author; the research design was developed in collaboration with Lindahl and Josephson who also supported in revising the paper. The data gathering was performed by Adam.

Paper II:

Adam is the sole author of this paper; the writing and data gathering was performed by Adam.

Paper III:

Adam is the first author; the research design was developed in collaboration with Lindahl who also contributed in revising the paper. The data gathering was performed by both authors.

Paper IV:

Adam is the first author; the research design was developed in collaboration with Lindahl and Leiringer who also helped in revising the paper. The data gathering was performed by Adam and Lindahl.

Additional publications

V. Leiringer, R; Lindahl, G; Adukpo; ES; Adam, A. Developing Public Sector Client Capabilities: The case of shared construction guidelines. *International Journal of Project Management* [Accepted with revisions].

VI. Adam, A; Lindahl, G. (2019). The role of NPM initiatives in shaping Swedish public client organizations: a driving force or a contributing factor? *In CIB World Building Congress, Hong Kong, PRC (SAR), 17-21 June 2019.*

VII. Adam, A., Lindahl, G. (2019). Dynamic capabilities and risk management: evaluating the CDRM model for clients. *In 10th Nordic Conference on Construction Economics and Organization, Tallinn, Estonia, 7-8 May 2019.*

VIII. Adam, A and Lindahl, G. (2017). Approaches to Safeguarding Sustainability Requirements in Large Public Construction Projects – the Client’s Perspective. *In CIB World Building Congress 2016, Tampere, Finland.*

IX. Adam, A. (2016). Managing construction challenges: Viability of a dynamic capabilities approach for the public client. Licentiate thesis. Department of Architecture and Civil Engineering. *Chalmers Reproservice, 2017.*

X. Adam, A and Lindahl, G. (2015). Take a chance on me? Construction client's perspectives on risk management. *Procedia Economics and Finance, 21, pp. 548-554.*

XI. Adam, A., Josephson, P. E., Lindahl, G. (2015). Implications of cost overruns and time delays on major public construction projects. *In Proceedings of the 19th International Symposium on the Advancement of Construction Management and Real Estate, Chongqing, PRC, 7-9 Nov 2014.*

XII. Adam, A., Lindahl, G., Josephson, P. E. Developing Capabilities for Public Construction Clients. (2015). *In Proceedings of the 19th International Symposium on the Advancement of Construction Management and Real Estate, Chongqing, PRC, 7-9 Nov 2014.*

XIII. Adam, A., Gluch, P., Julin, J. (2014). Using actor-network theory to understand knowledge sharing in an architecture firm. *In ARCOM 30th Annual Conference, Portsmouth, UK, 1-3 September 2014.*

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1 Introduction

The following section details the background to this thesis. It begins with defining the role and responsibilities of the construction client, the procurer and owner of construction work, which is followed by a description of the client's role in Sweden. The next section contains an account of some of the challenges that the construction client faces, specifically in relation to cost and time overruns. This account is then followed by a section that mentions recent attempts at connecting these challenges with a discussion on the capabilities of the construction client. The chapter ends with stating the purpose of this thesis and the research questions it addresses.

1.1 The construction client: roles and responsibilities

The construction client is the party that initiates the construction project and contracts other parties in order to supply construction goods or services to complete the project (Atkin & Flanagan, 1995; Boyd & Chinyio, 2008; SFS 2010:900). This formal description does, however, not mention the manifold of roles and functions that the client has and is involved with in the construction process. The client's role goes beyond project delivery as the client often acts as a bridge between the users and the suppliers active in the different phases of a construction project. In this respect, Gustavsson (2018) mentions that the client, and particularly the client organization's project manager is tasked with leading the project, its actors and its various activities towards the fulfilment of the project's goals. This is in line with earlier public discussions on the client's role as a major steering force for shaping construction processes and their results (ByggherreForum, 2006; Danish Government, 2003; Lindahl & Ryd, 2007; SOU, 2002:115).

The role of the client will differ depending on if the client builds to sell or to maintain and develop. Although the client's responsibilities are numerous, and the description thereof could be extensive, Bennet (1985) argues that they can be divided into five main areas: i) project objectives, ii) outlining the project organization, iii) selecting the project team, iv) establishing methods of control, and v) establishing the project culture. Due to the extensive responsibilities of the client, it is therefore vital that the client possesses the necessary knowledge to deliver projects. Additionally, there is a challenge in defining project goals, a challenge that is often more complex than executing and delivering project goals (Frödell et al., 2008; Lindahl & Ryd, 2007).

The International Construction Clients Forum (ICCF) highlights the continuous aspect of the client's role and the importance of managing the construction project throughout its life-cycle, which includes communicating with the actors in the supply chain and other relevant stakeholders (ICCF, 2006; Vennström, 2008). The ICCF considers a professional client to be one that has the capability of demonstrating leadership throughout the duration of the project. Instead of taking a passive role in the project coalition, the ICCF encourages the client to

actively participate in the project. Similarly, Nam and Tatum (1997) identified a high level of commitment by the client as a necessary precursor for effectively delivering projects.

Upon the provision of construction projects, goods and services, the client has ownership of the outcomes and has legal jurisdiction of the economic advantages (Boyd & Chinyio, 2008; Hillebrandt, 1985). Although it is within the definition of a 'client' that the term can refer to individuals (Mohammadi, et al., 2014), conventionally, the 'client' in construction is typically comprised of a group of individuals in the form of an organization. The client is thus not a solitary entity but instead a set of stakeholders that hold varying viewpoints with different needs (Newcombe, 1994; Rowlinson, 1999; Salisbury, 1998). For judicial purposes however, such as in the signing of contracts, the client organization is perceived as a solitary entity which may create some confusion since the representative of the client which has delegated authority could also be seen as a client (Boyd & Chinyio, 2008). In either case, the client organization can consist of a private company or a public organization, the latter being the focus of this thesis. Unlike the private sector that is incentivized primarily by its fiduciary responsibility and expectations of monetary returns of investment, the public-sector client is instead expected (by the public) to deliver projects that are of benefit to the greater society or that meet specific societal needs. The role of the public construction client is also predominately executed by the public authorities or organizations that represent the primary client: the elected political bodies that assign this responsibility to the administrations they govern.

The role of the construction client is particularly important since a large share of the GDP of both developing and industrialized societies involve the built environment. For instance, in Europe, the construction industry accounts for over 40% of the total energy consumption (Casals, 2006), in Sweden, that corresponds to approximately 10% of the nation's GDP (Swedish Construction Federation, 2016). The construction industry is also the dominant industrial employer in Europe, representing approximately 7.5% of total employment in the continent and 28.1% of industrial employment in the EU (Frazão & Rocha, 2017). Aside from the economic impact, the construction industry also contributes the largest share of global waste and pollution (Faniran & Caban, 1998), which is equivalent to 10-30% of total global waste (Begum, et al., 2009; Fishbein, 1998).

1.2 The construction client in Sweden

The Swedish Planning and Building Act (SFS, 2010:900) describes the construction client as the actor “that carries out or assigns others to carry out construction, demolition or land work.” The client is enjoined the responsibilities for ensuring that the construction work has been conducted in accordance with the provisions laid out by the act. These responsibilities include the functionality of the built environment as well as its design, technical solutions and the realization of projects. The client is also stipulated by other statues of law that govern working procedures, these include the Swedish Occupational Safety and Health Act, which the client must abide by, covering regulations governing the safety of the work place during production

as well as during use. Similarly, the Swedish Environmental Code details the client's duties with respect to meeting environmental requirements and criteria (Vennström, 2008).

According to the SCC (Swedish Construction Clients), an association founded in 1964 consisting of professional construction clients from both industry and government, the construction client's responsibilities extend to quality assurance of the construction process and the client is, as such, responsible for both the immediate and upcoming needs of the end users. From the public client's perspective, this translates into producing construction work within the framework of governing directives in such a way that the end-product satisfies societal demands. The SCC further stress the importance of having proper competencies/capabilities to be able to deliver the construction projects in an efficient manner (SCC, 2018). The significance of the clients' capabilities is touched upon in section 1.4 where I recount the emerging discourse on the client's capabilities in relation to the challenges that the client organization faces. Notable examples of these challenges are mentioned in the preceding section 1.3, focusing specifically on the challenges of cost and time overruns. These overruns are the subject of Paper I and II, which highlight the scope of cost and time overruns in public construction and how the dominant discourse regarding the causes of overruns has shifted in the research literature.

In Paper IV, I examine a network of public client organizations in the area of healthcare who are in the process of developing a set of guidelines for the construction of healthcare facilities. The importance of developing tools and guidelines for managing the construction process is further stressed by the large variety of challenges that the construction client faces, some of which are described below.

1.3 Challenges of the client organization

The construction client has repeatedly been challenged by governmental agencies to deliver better and more efficient projects (APCC, 2002; NAO, 2009; Productivity Committee, 2012). Construction projects have also been described as highly contentious (Winch, 2010), in part due to the challenge of managing the different, and at times, discrepant interests of its stakeholders (Olander & Landin, 2005). A central function of the construction industry and key to its activities in terms of setting goals and objectives is the programming and briefing process and its corresponding documents. These documents serve as a basis for budgeting, procuring and managing construction projects and are vital to the construction process. The responsibility to develop and produce the requirements governing a construction project is carried by the client and entails addressing challenges ranging from meeting investment plans to understanding the end-user's organizational requirements for their activities/business (Lindahl & Ryd, 2007). The end users' importance is further pointed out by Haugbølle and Boyd (2016), who argue that there is a need to shift the focus from "building as an end in itself to building as a means to achieve objectives related to the activities of the users of a building during its lifecycle" (ibid, p. 4).

Looking at research concerning the production phase in construction, it appears that the industry is consistently facing new studies reporting low productivity, inefficient operations and a reluctance to embrace innovative solutions (Koskela, 1997; Love & Gunasekaran, 1997; Ofori, 1993; Segerstedt & Olofsson, 2010). These studies span several decades, and although a considerable amount of resources have been spent on researching ways to improve the industry in these regards, questions remain as to whether results have been gained that effectively manage and deal with the challenges on a project and industry level (e.g. Bankvall, et al., 2010; Fulford & Standing, 2014; Vrijhoef & Koskela, 2000). Criticism regarding the performance of the construction industry have also been raised by governmental agencies. In the UK, the highly influential Egan (1998) report argued there was deep concern that the industry as a whole was under-achieving. The report noted that a large number of clients in the industry had been dissatisfied with the overall low productivity of the industry, stressing matters of low profitability and insufficient investments in capital, R&D and training. A sequel to the report published nearly a decade later concluded that “we are now in no doubt that, while some of the ideas need to be updated, the need for change is as strong today as it was eleven years ago” (Wolstenholme, et al., 2009, p. 5). A similar process of public discussion and criticism of the construction sector also occurred in Sweden (cf. SOU, 2002).

Although there is a tendency to emphasize the ‘low productivity’ of the construction industry, it is important to point out, as Flanagan et al. (2007) have, that comparisons of different industries’ productivity levels are difficult (Cattell, et al., 2004). The debate regarding productivity in construction or lack thereof has been ongoing for a long time, particularly with respect to comparisons made with the manufacturing industry. Winch (2003) addresses this contentious issue by stating: "from the Bauhaus of the 1920s to the Egan Report [...] critics of the industry have admired the continuous flow and falling real costs of car production" [ibid, p.651]. Winch criticizes the notion that the construction industry is less productive than other industries and does not consider the manufacturing industry as a suitable basis upon which comparisons can be made. Measurement of industrial productivity itself is generally problematic, and performing these measurements for the construction industry is particularly difficult (Ive et al., 2004). This difficulty can be explained in part due to the nature of construction work. For instance, the rate of labor productivity for a construction organization is affected not merely by the performance of that organization’s members but also by project design decisions that are outside of that organization’s control. Changes in market conditions may also affect the productivity and the rate at which organizations innovate (Ive et al., 2004). Although issues relating to productivity and innovation in the production phase are typically perceived to be outside of the client organization’s area of responsibility, these issues nonetheless have an impact on the client’s ability to deliver efficient projects (Lindahl & Ryd, 2007). Furthermore, the client’s ability to drive innovation in the industry through procurement policies has recently become a point of priority for the EU (Haugbølle, et al., 2013). Similar aspects are covered in Brandon and Lu’s (2008) extensive work on the client organization and the role of the client in driving innovation in the construction industry. Specifically, the book

seeks to address the role of the client in managing the underlying causes for the perceived lack of innovation, including matters relating to education and training; localized markets; the fragmented structure of the industry; as well as matters relating to incentivization and the tendering process. Thematically, Brandon and Lu (2008) cover three major parts, dealing with the context of innovation from the perspective of clients, the impact of the client on the innovation process and how novel ideas can be pushed through into practice. In response to the criticisms that the construction industry, and particularly the construction client, has received with respect to innovation, authors within the field have typically either chosen to accept these criticisms and attempt to rationalize or radically change the industry (cf. Egan, 1998; Russell, 1981; Wolstenholme, et al., 2009); or they have stressed the idiosyncratic nature of the industry and explained away any apparent lack in performance or innovation (cf. Ball, 1988; Winch, 2003).

Similarly, Brandon and Lu (2008) explore the often challenging, deeply contested and consistently complex nature of innovation in the context of construction. The contested matters relate to, among other issues, the degree to which the construction client has had an impact on innovation in construction. Although it is possible to state that clients have made some impact with regards to this area, researchers remain divided as to when and where clients should drive the innovation process, or whether or not they should be driving it at all. This discussion is further elaborated upon in Haugbølle and Boyd's (2017) more recent anthology on the topic which focuses on agency, governance and innovation with respect to the client organization. In doing so, Haugbølle and Boyd examine actions, roles and responsibilities, and the degree to which clients are bound by structural constraints. The importance of governance is stressed, referring here to the interplay that occurs between the clients and the supply system, which enables the clients to be in a position that governs the supply system whilst concurrently being governed by the supply system through its various actors, processes and mechanisms. The issue of governance is particularly important considering the large potential influence that the client can exert on the development of projects. Recent research has indicated that the informal aspects covering the relationship between contracting parties and the involvement of stakeholders have substantial influence on the governance of construction projects. This is a topic that Volker and Hoezen (2017) explore in their study of three large infrastructure cases initiated by the Dutch Highway Agency. By taking the structure–conduct–performance paradigm for strategic management (Mason, 1939; McWilliams & Smart, 1993) as a point of departure, Volker and Hoezen argue that the three main pillars of project governance are built around structure, people and information. Specifically, the authors explore how learning experiences that emanate from the procurement processes influenced the project governance of their studied case. They conclude that although specific adjustments were needed for new approaches and governance structures for each of the three projects studied, overall, learning from past projects increased the level of sense-making. This further facilitated the 'mastering' of the design process by having reduced the uncertainties related to the participating actors.

A more output-oriented approach on the effects of the built environment is described by Ryd (2014) where the client through value-based descriptions determines to what extent a project fulfils the requirements of the end user and the client's brief. However, the criteria for post-project evaluations are seldom described in such a way that follow-up is feasible (Lindahl & Ryd, 2007; PTS, 2018).

According to Forgues (2006), most of the studies that have examined ways to improve the performance of construction organizations have focused on the supply side by looking at contractors and consultants whereas less interest has been given to the client's perspective. Even in cases where the client's perspective has been given, it has often been given with respect to other stakeholders, such as studying contractor selection in the tendering process (Hatush & Skitmore, 1997; Walraven & de Vries, 2009), or value adding for the end users (Thomson, et al., 2006). Others, such as Gottlieb and Haugbølle (2013) have instead looked at the construction industry from a partnering perspective arguing that that the potential of partnering lies in its "ability to understand and manage conflicts and contradictions in and between existing institutionalized activity systems in construction" (ibid, p. 120). The focus of this thesis however is concentrated solely on the client from an organizational standpoint with an emphasis on the dynamic capabilities of the client organization.

Murray and Langford (2003) studied construction reports spanning half a century from 1944 to 1998 and showed that construction projects throughout this period have had difficulties delivering efficient projects in terms of cost, time and defect-free buildings; aspects affecting the client's efficient management of a construction project. The complexity of the construction industry is often mentioned as a contributing factor to these challenges (Enshassi et al., 2009; Gidado, 1996). Researchers stress the significance of construction projects being complex with certain authors claiming that the complexity is greater in construction compared with other industries, e.g. Winch (1989, p. 338) who claimed that construction projects are "amongst the most complex of all production undertakings " and the similarly strongly worded statement by Baccarini (1996, p. 201) that "the construction process may be considered the most complex undertaking in any industry." Adding to the statements concerning complexity, the construction industry is also often criticized for its waste (Doloi, 2008; Josephson & Saukkoriipi, 2005). A common argument is that construction has fallen behind other industries like manufacturing in implementing new techniques that would improve its processes (Dubois & Gadde, 2002).

Among the challenges that the construction client has faced, cost and time overruns have been particularly challenging. A cost overrun refers to an increase in the amount of funds required to complete a project above the original budgeted amount (Alinaitwe, et al., 2013). This is equivalent to the difference between the figure stated in the contract and the actual final cost of the project. The challenge here is not that the cost of the project is high, many construction projects are huge undertakings that will undoubtedly yield high costs. Instead, the challenge with cost overruns is that they exceed the planned costs of a project. This in turn requires more

resources than what was initially planned for, and in the case of public construction, those resources would have been taken from public funds that could have been spent elsewhere.

Cost overruns have persisted in the construction industry for many years (Akinci & Fischer, 1998; Memon, et al., 2011). Specifically, large construction projects have been shown to experience excessive cost overruns (Morris, 1990; Raftery, 2003; Siemiatycki, 2009). Indeed, a majority (63%) of 1,778 construction projects funded by the World Bank exceeded their budgets (Morris & Hough, 1987). Flyvbjerg (2007, 2014) report that large infrastructure projects such as rail and road construction often exceed their initial budgets, with cost overruns reaching 50–100% and in many cases going beyond 100%. The data for their study spanned 20 countries over five continents, going as far back as the late 1920's to the late 1990's. This shows that the challenge of cost overruns stretches across geographical settings, and although certain minor differences exist depending on the location, the challenge exists globally. Despite a large number of studies that have identified purported causes of cost overruns, there is still no evidence (Ahiaga-Dagbui, et al., 2017) that these have produced solutions that have alleviated this challenge. According to Kaming et al. (1997), the primary factors causing cost overruns are due to increases in material cost, inaccurate estimation of materials and project complexity. In discussing the causes of overruns, it is important to mention the client's role in demanding realistic cost estimates. This is an issue that Ahiaga-Dagbui and Smith (2014, p. 51) emphasize as particularly important:

Unless clients start demanding realistic estimates, rather than the lowest estimates at the early stages of a project, the problem of cost overrun might remain with the industry for a long time to come.

Similar to cost overruns, construction projects being delayed has constituted a persistent challenge in the industry (Anastasopoulos, et al., 2012; Bhargava, et al., 2010). A scheduling delay (time overrun) occurs when the project has not been completed at the planned completion date. The construction industry has had a poor record in terms of completing projects on time. In a report by the World Bank (1990), of 1,627 projects completed between the years 1974 and 1988, the average delay varied between 50% and 80% (Bordoli & Baldwin, 1998). The main causes for delays according to Kaming et al. (1997) are client-initiated design changes, poor original designs, low labor productivity and inadequate planning.

1.4 Addressing construction sector challenges through improving capabilities

A report published by the National Audit Office in the UK connects the poor performance of construction clients with what the issuers of the report recognize as a lack of commercial skills and expertise to manage large-scale projects. In particular, the report states that there is a shortage of formal mechanisms to allocate staff across the various governmental departments in a way that ensures optimal use of capabilities (NAO, 2009). This statement is echoed in the Swedish construction industry where procurement of infrastructure projects has undergone

extensive investigation leading to the conclusion that there is a “significant potential” for improving productivity, but in order to do so the client needs to be more efficient in planning and procuring projects (Productivity Committee, 2012). This line of thought was evident in two earlier governmental investigations that led to the publication of two reports: the first by the Swedish Ministry of Enterprise and Innovation and the second by the Swedish Agency for Public Management, strongly criticizing construction clients’ inability to change, lack of innovation and poor productivity whilst highlighting the comparatively weak role of the public construction client with respect to other actors in the construction industry (SOU, 2002:115, SOU 2009:6). Aritua et al. (2011) argue that in order to meet the challenges that the public construction client faces, the competencies of what they refer to as the “intelligent client” need to be clarified. They further argue that by clarifying the necessary competencies of the client, this would enable the public sector to engage more productively with the private sector and to obtain value for money.

On a similar note, Lindahl and Ryd (2007) note the need for clients to improve their skills to support development in the construction sector. The authors argue that having a more skillful and active client is important, particularly in regard to the client’s ability to select/procure experts or consultants when demanding what will be supplied (i.e. the briefing) and the manner in which it is to be supplied (i.e. the construction). This point is also brought up by Szentes and Eriksson (2015, p. 9) who argue that “public clients need to develop more competence”, particularly with respect to selecting partners. The notion of needing ‘more competence’ opens up for questions regarding the ownership of the project, and what the role and responsibilities of the client need to be; as well as what ‘more competence’ means in the larger discourse on dynamic capabilities and the public client, which constitutes the focus of this thesis.

The client’s role is increasingly important in light of the steep increase in the demand for construction work in Sweden, a demand that includes the forecasted need for building 710 000 homes before the year 2025 (Boverket, 2010), the majority of which are needed before the year 2020. In addition to this, there is also a demand for refurbishing housing areas, developing healthcare facilities and expanding current infrastructure (Regeringskansliet, 2015). This puts a strain on organizations in the construction sector, from clients to suppliers, requiring a need to focus on the ability to deliver. The construction sector is expected by governmental agencies to deliver on time and on budget whilst adhering to various environmental guidelines and other statutes. The client is responsible to formulate and follow up on requirements and criteria to manage these challenges. A public client is also mandated to publicly present a sound management of public funds which allows for transparency. Given that the public construction client has been instructed to develop more capabilities in light of the challenges mentioned above, this then led me to formulate research questions that aim at describing and understanding how client organizations could deliver projects considering the challenges that they are facing. The underlying question, and basis for this thesis, being if the terms ‘capability’ and specifically ‘dynamic capabilities’ can aid in understanding and managing those challenges.

This thesis, and its corresponding papers, take a different approach from earlier studies that have examined the performance of the public client to deliver projects. Unlike the established works of Flyvbjerg et al. (2009, 2014) and Morris (Morris & Hough, 1987; Morris, 2013), this study does not concern itself primarily with quantifying the scope by which the public client has fallen short; nor does it, as in the case of Flyvbjerg et al. (2009), attribute the public clients' perceived inability to deliver cost-efficient projects to primarily the realm of psychology. Instead, this thesis takes as a point of departure the works of Morris and Flyvbjerg mentioned above, and then seeks to address the challenges that they discussed by utilizing the dynamic capabilities concept as a lens.

The reason for studying the construction clients' challenges through a dynamic capabilities lens is primarily because it provides a means by which we can examine the development of organizations, specifically as that development relates to how these organizations can deploy their capabilities to enact changes that are congruent with their changing environments. It is thus a strong contention of mine that in order for us to gain a holistic perspective of *why* the public client has been underperforming, it is vital to not merely examine the various factors that govern this performance, whether they are institutional, technological or psychological factors, but also to analyze this performance by applying a theoretical concept that, ipso facto, is concerned with explaining how certain organizations can achieve a more desirable performance. For this thesis, that theoretical concept has consisted of the dynamic capabilities concept. Although it would certainly be possible to make use of a different theoretical concept to explain the construction clients' challenges (e.g. agency theory, institutional theory etc.), I have opted to not use these theoretical concepts in place of the dynamic capabilities concept, in part because the latter presents an approach that has not been used to address the public clients' challenges. The relatively few research papers that adopted a dynamic capabilities approach to analyze a construction-based organization prior to the year 2014 (beginning of this PhD thesis) focused either on a specific contractor (Green et al; 2008), or a range of construction SMEs (Gajendran et al., 2014) or similar. However, to the extent of my knowledge, no work had been done from the perspective of the public construction client. This allowed me an opportunity to evaluate whether the dynamic capabilities concept (which had been used in other fields with promising results) could provide a lens to examine the client-specific challenges that I sought to address with my research.

Finally, it should also be mentioned that although the dynamic capabilities concept had not been widely utilized to address the public construction client, other 'capabilities approaches' have been utilized previously. It is important to note, however, when talking about these approaches, such as the 'capabilities approach', an economic theory, or Capability Maturity Models (CMM) that are used in IT-related research, it is necessary to differentiate these and similar 'capability-centric' approaches from the dynamic capabilities concept. Although these various theoretical concepts all make use of the term 'capability', the definition of the word differs so extensively as to render any comparison between these different concepts irrelevant. An

account of how ‘capabilities’ are understood from within the dynamic capabilities literature is given in Chapter 2.

1.5 Research outline

The initial research in my thesis project focused on reviewing the construction-related challenges that pertained to the stated research questions (Paper I) whilst introducing the dynamic capabilities concept as a theoretical framework to deal with responses to these construction-related challenges (such as cost and time overruns). The publications that emerged from this were predominately designed to discuss the viability of using a dynamic capabilities approach to analyze the research questions. This initial research concluded with a licentiate thesis published in 2016 which argued that the dynamic capabilities approach in its present form was inadequate to explain how client organizations could develop capabilities that would allow them to meet the aforementioned construction-related challenges (Adam, 2016). Instead, I put forward an argument that there was a need for a more suitable framework capable of capturing the specific context in which public client organizations operated. As a framework, it would perhaps be too specific to be applied outside of the immediate context of public client organizations, however, when applied in a case that fits that description, the results might be more relevant for the studied case. In developing such a framework, a key component would be to avoid studying ‘client capabilities’ as a whole and instead examine a *subset* of the clients’ capabilities that can be more clearly described through empirical observations (as described in Paper IV).

The continued research (Paper II) sought to bridge the construction challenges discussed in Paper I with respect to the dynamic capabilities concept discussed in Paper III. The final paper applied the framework of Davies and Brady (2016) in a case involving public construction clients with the aim of examining their approaches for maintaining or developing project capabilities depending on the volatility of the environment (Paper IV).

1.6 Aim and research questions

This thesis explores the way in which the concept of dynamic capabilities can aid in managing client capabilities in a way that addresses construction-related challenges. In pursuit of this aim, the thesis includes two papers (Paper I and II) that examine specifically the challenges of cost and time overruns in public construction. In the remaining two papers (Paper III and IV), the thesis covers the case of a large Swedish construction client (PubClient), as well as an association of 16 real estate client organization, representing county councils in Sweden (16 of the country’s total 21 counties).

The thesis explores public construction clients’ dynamic capabilities by means of: i) examining the process whereby capabilities are managed within the organizational structure and ii) the relationship of dynamic capabilities and construction-related challenges. By focusing on dynamic capabilities, the input, as well as the output of project specific-goals such as delivering projects that are cost and time-efficient, a more comprehensive view of capabilities

is described. The dynamic capabilities framework is essentially used as an interpretive tool to make sense of *i)* and *ii)* and the role that capabilities have in shaping the performance of large public construction clients.

The research questions are formulated as follows:

RQ1: What are the underlying mechanisms of dynamic capabilities?

RQ2: How can dynamic capabilities be understood and used by public clients to address construction-specific challenges?

Although the first question may seem as an objective, a matter of merely defining a term and providing an answer; it is rather crucial as the response to that question will shape aspects of the discussion later in this thesis. The research questions begin by first inquiring about the dynamic capabilities concept, then seeking to understand how that concept may be used in a public construction context.

1.7 Case descriptions

The different organizations that have been studied in this thesis are: PubClient, a large Swedish public construction client organization, and PTS Forum, an association of 16 public construction client organizations/divisions from Swedish counties. The section below describes each of these different types of organizations.

1.7.1 PubClient – a large Swedish municipal client organization

The study in Paper III focused on a municipal client organization which is referred to as PubClient. As one of Sweden's largest maintainers of public facilities, PubClient is involved in both the construction of public facilities and the refurbishment and maintenance of those facilities. The organization has a yearly expenditure of approximately one billion SEK, of which the majority (70%) is made up of investments in new facilities. The remainder consists of renovations and maintenance of the current stock. The different projects PubClient is involved with includes: nurseries, homes for people with special needs, educational facilities and residencies for the elderly. PubClient also receives requests for additional changes and maintenance work to existing facilities. The scope of the requests tends to vary; some are smaller in size, such as requests for the lighting equipment to be changed whereas others are larger such as requests for relocating entire building elements.

From 2008, PubClient has undergone a significant reorganization. This process culminated in 2011 when PubClient and its project division was merged with two facilities management divisions (educational facilities and housing for elderly) while relocating its strategic planning unit to the municipality's central planning and management division. This change coincided with a larger regrouping of the municipality's districts/local councils. The reorganization of PubClient also included the creation of two separate support units: a procurement unit and a technical unit. Prior to this, the members of the organization had individual responsibility for

the areas that were now covered by the procurement and technical units, in parallel to them being project managers. Following the reorganization, the support units that had been developed had similar objectives, serving primarily three purposes: the first was to offer support to the project organization that delivers and manages the individual projects. The second purpose was to handle matters that relate to national and municipal laws, governmental regulations and EU directives. The third purpose was to provide market research, experience feedback and reports on internal development.

The decision to reorganize came at a time when the construction industry in the region had faced a number of corruption scandals that had affected some of the public client organizations in the municipality, but not PubClient. It also came during a time of economic recession which led to a reduction of construction work following the subprime crisis of 2008. The approach to reorganizing was this time different from the one that had occurred during the former recession in 1992. In 1992, the real estate market in Sweden was affected by a severe decline in property values. Prior to the recession in 1992, client organizations possessed greater capabilities in the form of having their own technical departments with in-house project planners, technicians and other roles needed to deliver projects. As a result of the economic recession, client organizations were downsized and functioned primarily in an administrative capacity, which meant that they had few project managers that utilized several PM consultants. Similarly, the recession of 2008 also led to a reorganization of client organizations but instead of downsizing, client organizations expanded. The reason for this being that the number of external consultants was so high it motivated employing in-house staff. This diminished the dependence on using external PM consultants.

New governmental regulations in the years 2008-2010 required public construction clients to change some of their operating procedures. PubClient began working under more rigid guidelines, which included a requirement to comply to governmental policies regulating public procurement, most notably the Law of Public Procurement (LOU). Prior to the new regulations, PubClient had complied with LOU on an irregular basis, at times adhering to the law only when procuring large projects, and ignoring it when projects were small or it proved too complicated to follow. The changes in the organizational structure, as mentioned above, meant that the project managers who previously possessed a higher level of control would now have to relinquish some of that control and instead seek assistance from the support units and follow a common procedure for all procurements.

1.7.2 Swedish county client organizations – PTS Forum

The study in Paper IV examined 16 client organizations/divisions from different counties in Sweden (landsting) focusing on an organisation for collaboration and development of standards and guidelines for construction; PTS Forum (Program for Technical Standard). 16 of 21 counties representing approximately 85% of the healthcare delivery in Sweden are active members in PTS Forum.

The responsibility for the healthcare system delivery in Sweden lies on the county level as do all support and service including construction for healthcare, in a decentralized group of 21 counties. As a forum, PTS was established to create a shared platform for these counties to interact and exchange experience and knowledge from one another with respect to how to build more efficiently and achieve value driven healthcare facilities. PTS is meant to aid in the construction process for county councils in Sweden through strengthening the client's role through active assumption of responsibility by providing clear and structured guidelines.

PTS Forum was formed to support cross-county knowledge transfer and to fill the gap left when the national standards and development institute, SPRI, was abolished in 1992 (Ring, 2017). PTS is thus a forum for exchanging ideas, data and experiences and it runs a database of technical solutions, standard rooms and briefing support documents to support the construction client function of the counties. The system is discretionary for the participating organizations. The association was founded in 2004 although many of the participating counties joined several years later. PTS offers support in the form of templates of briefing documents and showcasing standardized rooms for hospital settings with the aim of offering clear instructions and dependable solutions that can be reused for briefing, controlling and supporting the construction process. PTS also includes a basic project management support tool. Purported benefits of employing PTS include quality assurance through establishing a shared way of working, more efficient use of resources and reducing the time needed to initiate a new project. The purpose thereof is to strengthen the client's role by ensuring that the client acts correctly from the commencement of each new project. The participating organizations are also members of the Real Estate Organizations of County Councils that is run within the framework of the Swedish Association of Local Authorities and Counties, SKL, in Sweden and are considered as co-owners of PTS; each organization having one representative in the board of the PTS Forum (PTS, 2019).

Upon examination of the different processes employed by the various counties, the board of the PTS Forum in 2015 identified a need for expanding PTS to include processes and guidelines that provide support for the conceptual and early planning phases in the planning and construction process of healthcare facilities. The PTS database would then include a process for the conceptual and defining phase where requirements and qualities are set for the subsequent construction process. This would also make it possible to streamline the various processes and produce a more efficient way of working. Additionally, a database of conceptual and actual designs could be achieved that would enable a more efficient communication and decision-making process in the conceptual phase and the early design phase of a project (PTS, 2018).

Additionally, a Norwegian client organization (Sykehusbygg HF) is mentioned in Paper IV to provide a reference and comparison to the Swedish PTS case mentioned above. Sykehusbygg is a nationally centralized organization that oversees all major construction projects involving healthcare facilities in Norway. The data gathered for this comparison relied primarily on the

interactions that was made with a representative of Sykehusbygg during the workshop proceedings (see chapter 3.3.2), as well as the documentation that they provided at those functions which included process charts, slideshow presentations and an internal report containing guidelines for early-phase planning of healthcare construction (Sykehusbygg, 2017). Additionally, an interview was carried out with a representative of Sykehusbygg as well as an interview with an independent consultant knowledgeable of Sykehusbygg operating procedures.

Its mandate is to facilitate and contribute to standardization, experience transfer, efficient use of resources and resource access with respect to the construction of hospitals. Prior to the establishment of Sykehusbygg in late 2014, the different regional authorities of Norway lacked a central function that consolidated expertise and experiences for constructing healthcare facilities. A similar challenge that the PTS Forum aims to address in a Swedish context. The founding of Sykehusbygg represented an effort to centralize the way by which large hospitals were constructed in the various Norwegian counties (fylken). Construction client organizations in Norway involve Sykehusbygg for all healthcare-related construction projects exceeding 500 million NOK. Sykehusbygg thus operates as a central function for all major healthcare related construction developments. It provides a national centre of expertise for hospital planning at an international level; thereby stressing the importance of having an international perspective and being exposed to the larger developments occurring outside of the national context (Sykehusbygg, 2019).

1.8 Outline of the thesis

This section gives a brief overview of the outline for the remainder of this thesis. Following the introduction comes Chapter 2 which gives an account of the theoretical concept (dynamic capabilities) that has been used, the definition of the term, its emergence and use in a construction context. This is then followed by Chapter 3 which details the research methods that have been applied in the appended papers. A summary of these methods is shown in Table 1. Chapter 4 presents a summary of the four papers that have been appended to this thesis, highlighting results that have been obtained. Following this, Chapter 5 contains a discussion on the applicability of the dynamic capabilities concept in the context of construction clients and some of the challenges in using dynamic capabilities as a lens to analyze public construction clients. The thesis is concluded in Chapter 6 which details the implications of this research, both with respect to future research as well as implications that relate to practice, specifically within the construction industry.

2 Theoretical frame

This chapter provides the theoretical underpinnings of this study. It begins with a literature review that gives a brief historical overview of the theories that led to the development of the dynamic capabilities concept. The review highlights issues that have been raised both in favor and against the dynamic capabilities concept. In outlining the critique of dynamic capabilities, a summary of the critique levelled at the resource-based view (RBV) is also described. The reason for this is that the resource-based view constitutes the foundation that the concept of dynamic capabilities is based on, and the critique of RBV is therefore relevant and necessary to relate to when discussing dynamic capabilities. This section is then followed by a discussion of the dynamic capabilities concept, its definition and how it can be used as a framework, both generally and specifically as it pertains to construction clients.

2.1 The resource-based view

The resource-based view (RBV) is based primarily on the works of Wernerfelt (1984), Barney (1991) and Peteraf (1993). Unlike the competitive positioning school of Porter (1980), RBV relocated the focus back toward firms' internal strengths and weaknesses as opposed to external opportunities and threats (Green, et al., 2008; Priem & Butler, 2001).

RBV seeks to explain the sources of a firm's "sustained competitive advantage". According to Barney (1991), a firm can achieve sustained competitive advantage if it can acquire and manage resources and capabilities that are valuable, rare, inimitable and non-substitutable (commonly referred to as VRIN resources).

In some ways, RBV was similar to the earlier research of Ansoff (1965) and Learned (1969) who looked at firms' internal characteristics to identify 'best practices' for achieving firm success. Building on the works of Penrose (1959) and Rubin (1973), Wernerfelt (1984) argued for the importance of internal resources as the antecedents of products and more importantly of performance; the focus being on the internal. By providing an inside-out view for understanding organizational performance, RBV becomes a useful approach in the public sector, where competition is not a focal issue. For that reason, RBV has been used to explain value creation in public organizations (Matthews & Shulman, 2005).

Makadok (2001) distinguishes between the terms 'capability' and 'resource' arguing that capability is essentially a special type of resource that is organizationally embedded, non-transferable, firm-specific and whose purpose is to improve other resources in the organization. Despite the popularity of RBV as a theory, there were dissenting voices. Critics questioned whether RBV was a tautology due to the way the terms 'valuable' and 'competitive advantage' could be defined (Foss, et al., 1995; Hoopes, et al., 2003; Priem & Butler, 2001). RBV theorists contended that a resource could be a source of competitive advantage if it was both rare and valuable (Barney, 2001), which Priem and Butler (2001) argued was a tautology if one were to assume that 'value' and 'competitive advantage' were defined in similar terms. For instance, a

tautology could be said to exist if ‘valuable’ resources are those that improve effectiveness/efficiency, and ‘competitive advantage’ is defined as the achievement of improvements in effectiveness/efficiency. In other terms, saying that “valuable resources help create competitive advantage” is akin to saying that ‘resources that create competitive advantage help create competitive advantage’ if we assume that valuable resources are defined as those that create competitive advantage. Barney (2001, p. 41) responds to the allegation of RBV presenting a tautology by arguing that because “Priem and Butler are able to restate parts of the 1991 argument in ways that make it tautological is not the same thing as demonstrating that the argument is, in fact, tautological”. Instead, Barney claims that the real challenge posed by Priem and Butler is not whether or not some aspects of RBV can be restated in a way that makes it tautological but rather whether there are aspects to RBV that can be parameterized in ways that can generate testable hypothesis. Barney then goes on to argue that the components of RBV (specifically the VRIN resources) can be parametrized in ways that can generate testable propositions and that this then negates any argument of RBV constituting a tautology.

In response to the critique put forward by Priem and Butler, Makadok (2001) stated that Priem and Butler were mistaken since they equated RBV solely with the works of Barney and his views of sustained competitive advantage. Instead, Makadok (2001) argued that the RBV tradition should be viewed as a whole, beginning with Wernerfelt (1984), who focused on resource heterogeneity on a corporate level to Barney’s (1991) framework of competitive advantage, and ending with Peteraf (1993), who produced a coherent framework on how competitive advantage was sustained in both the business-unit and at the corporate level. To take Barney’s work in isolation according to Makadok (2001, p. 498) would be akin to having “removed a brick from a wall and concluded that the brick is not a wall.” Barney’s work, or for that matter that of Wernerfelt or Peteraf, when taken in isolation would fail to constitute a separate theory as each of the authors only contributed one component to the overall theory. RBV has also been criticized for the theory’s frequently opaque terminology (Green, et al., 2008). It is not always clear how terms such as *skill*, *competence*, *capability*, and *resource* differ from one another.

Moreover, there are important contributions that RBV has brought to strategic management research, contributions which critics also affirm, namely that RBV provides a theoretical framework for discussing the relationship between resources and competitive advantage. However, it does not specifically address the process whereby future valuable resources are generated nor does the theory account for how the current stock of VRIN resources are amended in dynamic environments (Ambrosini & Bowman, 2009). To address this issue, an extension to the theory was developed, an extension that centered around the term ‘dynamic capabilities’.

2.2 Dynamic capabilities

The dynamic capabilities concept traces its theoretical heritage to that of the RBV tradition of the 1980’s and the evolutionary economics of Nelson and Winter (1982). Similar to RBV,

proponents of dynamic capabilities, chief among them Teece et al. (1997), Eisenhardt and Martin (2000) and Zollo and Winter (2002) argue that a firm’s competitive advantage lies in its ability to manage its resources. The concept of dynamic capabilities can thereby be firmly placed in the ‘internally-focused category’ described by Hoskisson et al. (1999).

Teece et al. (1997, p. 516) define dynamic capabilities as “the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments.” Unlike ordinary capabilities (also referred to as operational capabilities) that enable an organization to perform its current activities, dynamic capabilities encompass new resource configurations for the organization (Teece, 2012). Examples of dynamic capabilities include: alliance and acquisition capabilities, R&D teams that are cross-functional, new product development routines, resource allocation routines, quality control routines, and performance measurement systems used to build, integrate, or reconfigure other resources and capabilities (Eisenhardt & Martin, 2000; Fischer et al., 2010; Teece, 2007).

Contrary to RBV, which has a more static conceptualization of resources, Teece et al. (1997) emphasize the importance of the dynamic environment. The key differences of RBV and dynamic capabilities are shown in Table 1.

Table 1: A comparison of RBV and dynamic capabilities (adapted from Cavugsvil et al., 2007).

	Resource based view (RBV)	Dynamic capabilities
Conceptualization	Bundle of heterogeneous resources.	Specific organizational resource by which an organization alters its resource base.
Resources/capabilities	Idiosyncratic.	Idiosyncratic with commonalities.
Environment	Does not differentiate.	Dynamic.
Competitive advantage	From VRIN resources: valuable, rare, inimitable and non-substitutable. Seeks <i>sustained</i> competitive advantage.	From valuable, rare and substitutable dynamic capabilities. Seeks competitive advantage.

Instead of seeking sustained competitive advantage like RBV, proponents of the dynamic capabilities concept argue that sustained competitive advantage cannot be attained due to the fast-changing environment (Wójcik, 2015). Instead, competitive advantage is transient and not sustainable (i.e. does not persist over time). Eisenhardt and Martin (2000) clarify this point by arguing that the sustained competitive advantage that RBV attribute to VRIN resources are not fully applicable when discussing dynamic capabilities. They argue that dynamic capabilities are typically *valuable* and to some extent *rare* but they are not *imitable* nor are they *non-*

substitutable. Instead, Eisenhardt and Martin (2000) state that dynamic capabilities are ‘equifinal’ in that organizations can gain the same capabilities from many different paths independently from other organizations. Thus, whether they can imitate other firms or find substitutes is not that relevant since managers of organizations can discover them on their own. For this reason, Eisenhardt and Martin (2000, p. 1110) suggest that “dynamic capabilities per se can be a source of competitive, but not sustainable, advantage.”

Despite the widespread use of the definition put forward by Teece et al. (1997), no consensus has been reached with regards to how dynamic capabilities are to be defined. Indeed, a number of varying definitions have been suggested. The table below describes some definitions that are frequently used in the dynamic capabilities literature.

Table 2: Common definitions of dynamic capabilities.

Author(s)	Definition
Griffith and Harvey (2001)	Global dynamic capabilities is the creation of difficult-to-imitate combinations of resources, including effective coordination of inter-organizational relationships, on a global basis that can provide a firm a competitive advantage
Helfat et al. (2007)	The capacity of an organization to purposefully create, extend and modify its resource base.
Teece et al. (1997)	The firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments
Wang and Ahmed (2007)	A firm's behavioural orientation constantly [sic] to integrate, reconfigure, renew and recreate its resources and capabilities and, most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage
Winter (2003)	[Dynamic capabilities are] those that operate to extend, modify or create ordinary capabilities
Zahra et al. (2006)	The abilities to reconfigure a firm’s resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker(s)
Zollo and Winter (2002)	A dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness.

The range of definitions above show that the term ‘dynamic capability’ means something different depending on who is asked. It also shows that authors such as Teece et al. (1997) do

not differentiate between competence and capability. According to Helfat et al. (2007), a capability denotes the ability to perform a particular task or engage in a specific activity. This is in line with its dictionary definition in which capability is viewed as “the power or ability to do something” (Oxford Dictionaries, 2019). To be able to do something suggests that there exists a potential for improvement. This potential is more explicitly stated in Merriam-Webster’s Dictionary (2019) where capability is defined as “a feature or faculty capable of development.” Therein lies the implication that capabilities can be regarded as a type of resource, one that could be both managed and developed. This view of capability as a “tool” that can be managed, harvested and deployed at will is a viewpoint that is seen in the writings of Eisenhardt and Martin (2000), Teece et al. (1997) and Zott (2003).

Like its predecessor, RBV, much of the terminology that deals with dynamic capabilities, including terms like capability, resource, competence and skill are not always clearly defined in the dynamic capabilities literature; instead, they are often opaque (Green, et al., 2008). Even though there are varying definitions, some common ground does exist in regard to what constitute dynamic capabilities. Winter (2003) argues that there is a consensus in the literature that dynamic capabilities have to do with adapting to organizational change which can be shown from the body of work published by dynamic capabilities researchers (Eisenhardt & Martin, 2000; Helfat, et al., 2007; Teece, et al., 1997; Zollo & Winter, 2002).

As for the critique that the dynamic capabilities concept has received, much of it consists of repeating previous critique levelled at RBV. Proponents of dynamic capabilities have to some degree been left with the ‘intellectual baggage’ that RBV had been dealing with. This includes what Green et al. (2008, p. 66) regard as the “tortuous nature” of its contested terminology. Aside from this, the concept has also been criticized for its purportedly circular logic. Zahra et al. (2006) attempts to illustrate the tautological aspect of arguing that an organization is better than another due to its capabilities if dynamic capabilities are those that only result in competitive advantage. In response to this line of reasoning, Eisenhardt and Martin (2000) have proposed that no argument was being made that dynamic capabilities must result in competitive advantage; they may or may not do so. Instead the value of a dynamic capability is defined independent of the organization’s performance which enables empirical falsification. In their view, dynamic capabilities are not a sufficient condition for competitive advantage, but a necessary one.

2.3 Dynamic capabilities framework

The dynamic capabilities framework that is referenced in Paper III refers to the framework developed by Teece et al. (1997, 2007 and 2012). In these studies, the authors describe a number of key characteristics of their proposed framework which has been summarized in Figure 1.

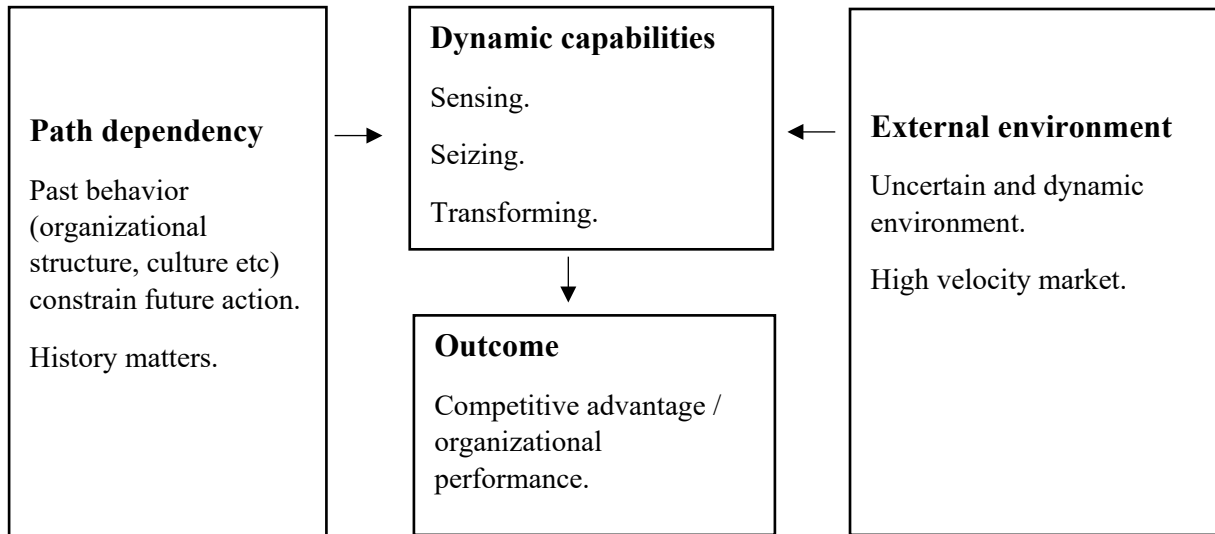


Figure 1: The dynamic capabilities framework (adopted from Teece et al., 1997).

The dynamic capabilities framework contains a number of characteristics, the most important of which are shown in Figure 1 above and further explained below. The framework does not provide prescriptive guidance (Teece, 2012/2013); it is instead used as a lens to understand the relationship between capabilities and organizational performance in a dynamic setting. Teece et al. (1997) and Eisenhardt and Martin (2000) place importance on the dynamic aspect being tied to the external environment. In other words, because the external business environment is ever-changing, organizations need to adapt to these changes by building and reconfiguring their internal and external capabilities.

2.3.1 Path dependency

A key concept in the dynamic capabilities literature relates to the notion of path dependency or what Teece et al. (1997, p. 522) refer to as “bygones are rarely bygones”. It is argued that dynamic capabilities are idiosyncratic (they are unique to each organization), and that past events in an organization’s history will constrain and affect its future behavior. Consequently, in order to understand how resources can be created or altered to address change, it becomes necessary to look at the organization’s past and how its history and the actions it has executed may have influenced its current trajectory.

2.3.2 Sensing, seizing and transforming

According to Teece (2012), dynamic capabilities can be categorized into three clusters of activities and adjustments: (1) *sensing* which refers to the identification and assessment of an opportunity; (2) *seizing* which consists of mobilizing resources in order to address an opportunity and capture its value; and (3) *transforming (resource configuration)* which refers to the continued renewal of the organization.

Sensing is an activity that involves scanning, learning and interpretation. It typically requires investments in research, development work and related activities (Teece, 2007). The purpose of sensing is to identify and shape new opportunities that arise, and by doing so, provide market intelligence (Kindström, et al., 2013). In order to identify and shape opportunities, organizations need to perpetually search and explore different technologies and markets, in both local markets and distant ones (Nelson & Winter, 1982; Teece, 2007). It is an activity that goes beyond investments in research and the probing of customer needs; it also includes understanding latent demand, the structural development of markets, and probable responses from suppliers and competitors. To be capable of sensing new opportunities, organizations need to avoid having a narrow search horizon (Teece, 2007). The wider the search horizon, the likelier the identification of new opportunities.

Seizing refers to the determining and implementing of new opportunities that have been identified as conducive to competitive advantage (O'Reilly & Tushman, 2008; Teece, 2007). In order to seize capabilities, the organization needs to be capable of sustaining and exploiting new opportunities as they occur (Hodgkinson & Healey, 2011; Teece, 2012).

Transforming is the activity by which the organization continuously reconfigures its resource base by adjusting internal/external resources as needed (Teece, 2007). Although minor adjustments may be adequate to sustain the exploitation of current opportunities, if the environment changes, the organization needs to undertake a more extensive reconfiguration (Helfat et al., 2007).

2.4 Learning mechanisms of dynamic capabilities

Unlike Teece who wrote about dynamic capabilities from within the strategic management literature, others (such as Zollo & Winter, 2002) have researched dynamic capabilities from within the knowledge and learning literature. Building on the works of Teece et al. (1997), Zollo and Winter (2002) investigate the learning mechanisms that enable an organization to develop dynamic capabilities. Zollo and Winter's (2002) paper can be traced back to the earlier works of researchers such as Polanyi and Grene (1969), Nonaka (2000) and Gherardi and Nicolini (2002). Polanyi (1958/1969) is credited for introducing the term "tacit knowledge"; while explicit knowledge can be both expressed and codified, tacit knowledge is difficult to articulate. The distinction between knowledge that is tacit and/or explicit is often ambiguous. To share explicit knowledge, one would utilize tools gained through tacit knowledge and the two terms are therefore dependent on each other. Despite tacit knowledge being dependent on the context and the person, it is however possible to share, through for example socialization (Fernie et al., 2003).

Writing from within the context of the knowledge and learning literature, Zollo and Winter (2002) are primarily concerned with deliberate learning, the mechanism whereby organizations can actively learn new capabilities that will allow them to gain competitive advantage. The

authors suggest that there are three types of learning mechanisms that organizations utilize to develop dynamic capabilities:

- i) experience accumulation
- ii) knowledge articulation
- iii) knowledge codification

Zollo and Winter (2002) argue that dynamic capabilities are formed by the coevolution of these three learning mechanisms. In a sense, organizations adopt a mix of learning behaviors that are influenced by an accumulation of experience and by deliberate measures through knowledge articulation and codification activities. *Experience accumulation* is a tacit process that does not occur intentionally, but instead through individuals' exposure to different situations and experiences.

Knowledge articulation constitutes an important mechanism for learning. It consists of the collective process of individuals expressing/articulating their opinions with one another through constructive confrontations which allows the individuals of that organization to challenge and learn each other's viewpoints (Argyris & Schön 1978; Duncan & Weiss, 1979). Through this, Zollo and Winter (2002) argue that organizational competencies improve as members become increasingly more aware of the performance implications of their respective actions. Although knowledge codification can be manifested in different ways, it represents the process through which implicit knowledge is expressed or articulated [through collective discussions, debriefing sessions, and performance evaluations]. The process of sharing individual experiences and comparing opinions with each other enables the organization's members to achieve a higher level of understanding of the causal mechanisms "intervening between the actions required to execute a certain task and the performance outcomes produced" (Zollo and Winter, 2002, p. 341) There is often some ambiguity with respect to the performance implications of organizational processes (Lippman & Rumelt, 1982), and more so in rapidly changing environments. Enabling a more deliberate collective focus on the learning challenge can aid in penetrating this ambiguity, albeit, some part of it may continue to persist.

Zollo and Winter (2002) further state that if knowledge articulation necessitated a higher level of cognitive effort than tacit experience accumulation, knowledge codification so too represents an even higher-level of cognitive effort. This codification, whether it occurs to the writing of manuals, blueprints, spreadsheets, decision support systems or through IT-based systems, requires that the individual who engages in the codification understands the performance implications of the written guidelines. There is of course an additional 'cost' to codification seeing as most articulated knowledge does not end up as codified procedures. In order to make sense of when codification would be valuable for the organization to pursue, Zollo and Winter (2002) propose two hypotheses of the nature of codification and dynamic capabilities:

- i) "The lower the frequency of experiences, the higher the likelihood that explicit articulation and codification mechanisms will exhibit stronger effectiveness in

developing dynamic capabilities, as compared with tacit accumulation of past experiences.” (ibid, p. 347)

- ii) “The higher the heterogeneity of task experiences, the higher the likelihood that explicit articulation and codification mechanisms will exhibit stronger effectiveness in developing dynamic capabilities, as compared with tacit accumulation.” (ibid, p. 348)

They argue that unlike the conventional approach of only codifying knowledge for experiences that occur frequently, organizations could benefit more by codifying knowledge for experiences that do not occur frequently. The rationale behind this is that individuals typically build up an understanding of how to handle experiences that come up frequently through tacit accumulation, they become conditioned to handle those experiences by being exposed to them on a frequent basis. For infrequently occurring experiences however, this accumulation of experiences cannot occur and for that reason, organizations would be in greater need of having written guidelines in place that deal with how to handle such situations.

2.5 A dynamic capabilities framework tailored to the public construction client

The works of Teece et al. (1997) and Eisenhardt and Martin (2000) represent the dominant understanding of dynamic capabilities in the research literature. What is particularly noteworthy is that the term ‘dynamic capabilities’ is conceptualized based on empirical studies of *technology firms* which function in highly volatile and uncertain environments. It would thus seem as no coincidence that the dominant proponents of dynamic capabilities are based in the highly tech-centered area of Silicon Valley; David Teece representing UC Berkeley and Kathleen Eisenhardt out of Stanford University. To define dynamic capabilities from within this tech-centered view is not necessarily an argument against it, it does however raise questions as to whether its applicability carries any weight *outside* of this limited context.

At the end of my licentiate thesis, I argued that although adopting dynamic capabilities in the context of public construction clients was possible (as viewed in Paper III), it nonetheless would be more useful to have a tailored framework of dynamic capabilities that sought to take into account the specific peculiarities of construction clients. In pursuit of such a tailored framework, three recent studies have used the dynamic capabilities concept to address the public construction client: Davies et al. (2016), Davies and Brady (2016) and Winch and Leiringer (2016).

As for Davies et al. (2016), they seek to categorize the developmental phases whereby dynamic capabilities are developed in a project-based setting. Davies et al. (2016) argue, based on a longitudinal study of a major construction project, that dynamic capabilities in a project-based setting develop through three stages: i) learning phase ii) codifying phase and iii) mobilizing phase. It is during the *learning phase* that the organization identified the need for a change of current operating procedures/routines. There is a deliberate search process initiated by the

organization that seeks to identify viable alternatives to current operating procedures (Crossan et al., 1999; Gavetti & Levinthal, 2000).

Following the learning phase is the codifying phase which represents a formal response to the learning phase. It is during this phase that the organization can ascertain what works and what does not work from the learning phase through deliberately writing down guidelines, rules, and tools etc. The aim of the codifying phase is the development of governing mechanisms for performing tasks that enable the knowledge that was captured in the learning phase to be stored and transferred across both time and space (Davies et al. 2016; Prencipe & Tell, 2001; Zollo & Winter, 2002). In comparison with the learning phase, the codifying phase is more resource-intensive because of the direct costs of the time invested, resources spent and managerial attention allocated in addition to the indirect costs that could emerge if prior learning and performance implications have not been appropriately captured (Prencipe & Tell, 2001; Zollo & Winter, 2002).

The final phase, *mobilizing phase*, refers to when the deployment of new dynamic capabilities occurs by putting into action the outcomes that were obtained from the previous codifying phase. As such, during the mobilizing phase, new routines are generated and past routines are extended, which may not be a linear process since new routines do not necessarily generate intended outcomes (Helfat et al., 2007; Nelson & Winter, 1982), and may therefore have to be reevaluated and modified before being deployed. Hence, even though the mobilizing phase enables the stability of routines, there is nonetheless flexibility at the initial stages in response to the feedback from deployment (Davies et al., 2016).

As for Davies and Brady (2016), their paper begins by emphasizing the gap that exists in the dynamic capabilities literature (Teece et al., 1997; Eisenhardt & Martin, 2000, etc.) with regards to exclusively studying organizations that utilize a permanent structure (in contrast to a temporal project-based structure). Davies and Brady (2016), build on O'Reilly and Tushman's (2008) work on organizational ambidexterity, which in turn is based on Duncan (1976) and March (1991). Davies and Brady (2016) argue that the mechanisms by which *project-based* organizations, such as construction clients, develop and maintain dynamic capabilities are different than those organizations that do not utilize a project-based structure. Similarly, Eriksson (2011, p. 10) states that due to the project-based nature of the construction industry, "structural ambidexterity on firm and business unit level may not achieve desired ends" and that there is a need for contextual ambidexterity at the project-level "in order to reap the benefits of an appropriate balance between exploration and exploitation."

Davies and Brady's (2016) study offers an attempt to bridge the gap between developing dynamic capabilities in project-based organization versus doing so in a permanent organization by expanding the dynamic capabilities concept to address organizations that utilize *both* a project-based structure as well as a permanent structure. In doing so, the authors presuppose an ambidextrous dimension to project capabilities (Figure 2), stating that

the deployment of dynamic capabilities in project-based sectors requires balance between replication and renewal strategies. They argue that the less stable and predictable the conditions are in the projects, the greater the need for dynamic capabilities that enable the development of new project capabilities (renewal strategy). Likewise, if the conditions are more stable, then the adopted strategy should reflect this by continuing to exploit current operating routines.

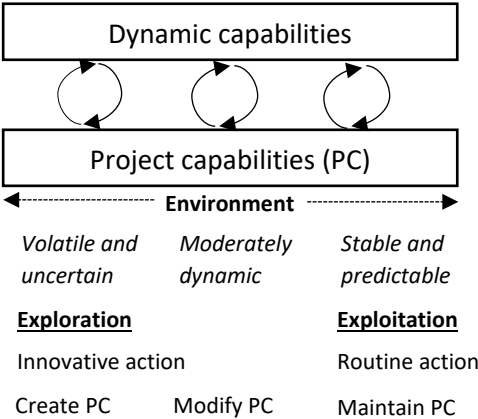


Figure 2: Exploration or exploitation approach for developing/maintaining project capabilities depending on the environment in a project-based context (adapted from Davies & Brady, 2016)

Winch and Leiringer (2016), take Morris’ (1987, 2013) decades long work on client organizations as a point of departure to formulate a framework that describes what the authors refer to as ‘owner project capabilities’ which they categorize into three groups: commercial capabilities, governance capabilities and strategic capabilities. These refer to the type of dynamic capabilities “required by the owner organization for the acquisition of infrastructure assets in order to extend or improve its operational capabilities in distinction to the operational capabilities deployed by the project-based firms which supply those assets” (Winch & Leiringer, 2016, p. 272).

Of particular interest are ‘governance capabilities’ as these address the interface between the permanent and the temporal project organization. Winch and Leiringer (2016) state that governance capabilities include the types of capabilities that are internally focused assuring senior management and policy makers of the progress of the project (*assurance*); the capabilities that allow for coordinating the project by enabling collecting and comparing scheduling and budgeting data with the planned budgets and time plan (*project coordination*); as well as the type of capabilities that are relevant in the post-development phase of the project whereby the created asset is integrated into existing operations for beneficial use (*asset integration*).

I make use of the ‘governance capabilities’ definition mentioned by Winch and Leiringer (2016) to study the case mentioned in Paper IV. The questions that were developed for the interview study in Paper IV were based on examining the capabilities of the studied case with respect to assurance, project coordination and asset integration.

2.6 Summary of the literature review

This chapter began by describing the dynamic capabilities concept, its origin and its definitions. It showed that the dynamic capabilities concept emerged from the resource-based view (RBV) and that the critique of dynamic capabilities was similar to that of RBV. Although it was shown that the term dynamic capabilities had varying definitions, there were nonetheless common characteristics. These characteristics include the focus on internal resource configuration, dynamic environment and path dependency. The characteristics were explained further in the discussion of the dynamic capabilities framework as described by Teece et al. (1997).

The aim of the literature review was not to provide an exhaustive description of dynamic capabilities that included a discussion of all of the different interpretations that exist of the term. Instead, my aim was to i) describe a brief history of the term in order to make sense of the context in which the concept emerged, and to ii) provide an understanding of how dynamic capabilities can be used as a framework. It is this framework that is featured in Paper III. In Paper IV, a case-specific revised framework of dynamic capabilities for construction clients is proposed, based on the framework of Davies and Brady (2016) using a narrower definition of dynamic capabilities (governance capabilities) mentioned by Winch and Leiringer (2016). The differences between various frameworks of dynamic capabilities relate to what facet of dynamic capabilities that is being scrutinized. For Teece et al. (1997) and Zollo and Winter (2002), they examine the activities, for the former, or learning mechanisms, for the latter, that generate dynamic capabilities. Unlike these two, generalized frameworks, the frameworks of Davies (Davies et al., 2016; Davies & Brady, 2016) as well as that of Winch and Leiringer (2016) seek to look at dynamic capabilities from a narrower project-based context and/or client specific context.

3 Method

This thesis is based on three studies: (1) an initial study based on literature reviews of cost and time overruns in public construction (Paper I and II) and dynamic capabilities (Paper II); (2) an interview study of PubClient, a large public construction client in Sweden (Paper III); and (3) an interview study of an association of 16 client organizations/divisions, representing 16 out of 21 county councils in Sweden (Paper IV).

A qualitative approach was adopted since it aims to deal with the complexity of social phenomena, I chose this approach in line with Bryman (1988, 2016) who noted that qualitative research focuses on and aim to understand the interpretations and perspectives of the studied individuals; the meanings they create and the interpretations that these individuals adopt.

The qualitative approach comprises a range of different methods which includes but are not limited to: observations, conducting interviews and transcribing the recorded interviews, and the analysis of written material (Silverman, 2001). The design of the research is that of a case study. By adopting the case study approach, my aim is to reach an in-depth perspective on how dynamic capabilities can be understood in a client organization. However, since the research is conducted with individuals having complex social interactions, it is important to acknowledge that the interviewees are not “objects” but social beings, and that the empirical data has been collected in a social environment which implies that the interpersonal skills of the interviewer could influence the results (Bryman, 2016; Remenyi et al., 1998).

The main unit of analysis was at the organizational level, the focus was not on individuals or specific projects, although I regarded it as necessary to include challenges that had occurred in projects due to the close relationship between what occurred at the project-level and at the organization-level. This was in line with Davies and Brady (2016) who stress the impact that particular projects (referred to as vanguard projects) can have an impact on the structure of the organization as a whole. It is particularly relevant in the construction industry where projects “do not simply occur against a backdrop of relatively established, routine activities”, but instead constitute the organization as a result of the complex interplay between constantly changing project conditions and the indeterminate and shifting organizational landscape (Bresnen, et al., 2004).

Furthermore, a combination of methods was adopted within the qualitative research tradition. The research is founded on a multi-method design (Leech & Onwuegbuzie, 2009), allowing for a degree of flexibility in order to adjust and adapt as the findings and data emerges. It consisted of case studies of client organizations that included interviews, workshops, a feedback questionnaire and an analysis of internal documentation. The focus of the internal documentation was on the management of construction processes and the knowledge development and decision-making processes therein. The research was undertaken in three studies (Table 3):

- I. *Study I.* The focus was on reviewing the available literature on the topic of client capabilities in relation to construction-related challenges, specifically with respect to identifying the causes of cost and time overruns (Paper I) and examining these with regards to what the dynamic capabilities concept can address (Paper II).
- II. *Study II.* A dynamic capabilities framework based on Teece et al. (1997, 2012) was used to study a specific case (Paper III). The purpose was to determine whether the dynamic capabilities concept provided a viable approach to explain construction-related challenges that had been identified in an interview study of a large Swedish client organization (PubClient). The study focused on the management of PubClient's capabilities amidst external pressure and internal reconfiguration of its organizational structure.
- III. *Study III.* The final study sought to apply a framework by Davies and Brady (2016) that utilizes the dynamic capabilities concept in order to explore the specific settings of construction client organizations (Paper IV). This was done by studying an association of 16 Swedish client organizations. The findings were further compared with the approach of a Norwegian national client organization (Sykehusbygg).

Table 3: An overview of the different studies covered in this thesis.

Studies	Purpose	Methods and approaches	Primary references
Study I	To explore the construction-related challenges that public client organizations face, particularly with respect to cost and time overruns and to view these challenges with respect to the dynamic capabilities concept.	<p>Paper I</p> <ul style="list-style-type: none"> ▪ A qualitative study exploring how past and current research regards the causes of cost overruns and time delays in major public construction projects. ▪ Literature review of studies on the construction client’s challenges with respect to cost and time overruns. ▪ Analysis of research articles on cost and time overruns, based on an initial search selection of 3833 articles which was filtered down to 40 articles. Results are visualized in a kivi diagram. <p>Paper II</p> <ul style="list-style-type: none"> ▪ A conceptual paper that seeks to bridge the research from Paper I with respect to the dynamic capabilities concept discussed in Paper III and IV. ▪ Literature review of dynamic capabilities and the construction client’s challenges with respect to cost and time overruns. ▪ Data analysis of cost figures from PubClient’s project portfolio (n=76 projects). 	Adam et al. (2017), Eisenhardt & Martin (2000), Flyvbjerg et al. (2004, 2007, 2014), Cantarelli et al. (2010), Teece et al. (1997).
Study II	To apply a dynamic capability framework addressing a case involving a public construction client in the midst of major organizational restructuring.	<p>Paper III</p> <ul style="list-style-type: none"> ▪ A qualitative study involving a case study of PubClient involving four interviews with two operational managers, one manager of energy and environment and the CEO. Three additional interviews with other client organizations. ▪ Literature review of the dynamic capabilities concept and Teece et al.’s framework. 	Eisenhardt & Martin (2000), Green et al. (2008), Helfat et al. (2007), Teece et al. (1997, 2007, 2012).
Study III	To apply a framework that addresses the specific settings of public construction client organizations with the aim of examining their approaches for maintaining/developing project capabilities depending on the volatility of the environment.	<p>Paper IV</p> <ul style="list-style-type: none"> ▪ Case study of an association of 16 Swedish client organizations (PTS Forum), which was later compared to a Norwegian client organization (Sykehusbygg). ▪ Total of 19 interviews were performed. ▪ Two workshop involving group discussions (n₁ = 22, n₂ = 20). ▪ A feedback questionnaire of participating organizations (n = 15). ▪ Literature review of a subset of dynamic capabilities relating to the public client. 	Davies and Brady (2016), Winch and Leiringer (2016).

3.1 Study I

The first study began by examining the current literature in regard to cost and time overruns in public construction. This led to the publication of Paper I which showed how the research literature had changed with respect to how the causes of overruns had been ranked in the past 40 years (between the years 1985-2014). The mapping of the causes underlying cost overruns and time delays in large public construction projects was done by segmenting the causes into eight relevant categories, which was then followed by an analysis of how the ranking data had changed during those three decades. Ranking data refers to the different rankings of causes that had been reported in the research literature (for example by ranking “change orders” as the most reoccurring cause of overruns). The average rankings were calculated on a Likert scale of 1-5, with ‘1’ constituting the highest rank. The ranking data was visualized using a kiviatic diagram (Figure 3) which illustrated how the identified causes for cost overruns and delays had shifted during the period 1985-2014. The study in Paper I examined primarily large public construction projects, which included both singular ‘mega projects’ as well as a portfolio of standardized projects that collectively made up a large-scale project (e.g. housing development).

Before the ranking data could be aggregated and visualized in a kiviatic diagram, a scoping of the research literature was performed, which drew on the methodical framework developed by Arksey and O’Malley (2005), consisting of five stages:

- Stage 1:* identifying the research question;
- Stage 2:* identifying relevant studies;
- Stage 3:* study selection;
- Stage 4:* charting the data; and
- Stage 5:* collating, summarizing and reporting the results.

The objective of conducting the literature review was to explore how past and current research had perceived the causes of cost overruns and time delays in major public construction projects. The selected literature was generated based on a string of keywords targeting cost overruns and time delays, the construction industry, factors or causes, public projects, and mega projects. Table 4 shows the precise keywords used to generate the selected literature. I chose the databases based on their listings of relevant papers in addition to including at least one database that had indexed the most well-known peer-reviewed journals in the field of construction management. This assessment of what consisted well-known journals in the field of construction management was based on a study by Bröchner and Björk (2008) that evaluated academic journals within the construction management field.

Table 4: The keywords and databases used in the literature search.

Database	Keyword string	#Results	#Journal articles
Scopus	TITLE-ABS-KEY ("cost overruns" OR "cost increases" OR "cost escalations" OR "budget overruns" OR "delays") AND TITLE-ABS-KEY (construction OR infrastructure) AND ("factor" OR "determinant" OR "cause" OR "explanation" OR "predictor") AND TITLE-ABS-KEY (projects)	1,103	587
Science Direct	TITLE-ABSTR-KEY(("cost overruns" OR "cost increases" OR "cost escalations" OR "budget overruns" OR "delays") AND ("construction" OR "infrastructure") AND ("factor" OR "determinant" OR "cause" OR "explanation" OR "predictor") AND ("projects"))	2,148	1,757 (998)*
Web of Science	TS=("cost overrun*" OR "cost increase*" OR "cost escalation*" OR "budget overrun*" OR delay*) AND TS = (construction OR infrastructure) AND TS = (factor* OR determinant* OR cause* OR explanation*) AND TS = (projects)	582	418

* Science Direct limited the number of results that could be retrieved.

The initial literature search generated a total of 3,833 papers which was filtered down to 1,748 papers by removing papers that were either duplicates or published in non-peer reviewed journals. The duplicate results came as a result of having used multiple databases. Following this filtering process, I manually examined the abstracts and titles of the remaining papers and excluded papers that i) did not mention factors causing cost overruns or delays in the construction industry, or ii) studies that included the search terms but used them in a different context than that intended for the purpose of this study, and iii) studies where the data came from exclusively small and/or private construction projects. In keeping in line with my stated research objective, I selected studies whose sample size or unit of analysis included public construction projects.

The filtering process resulted in 113 remaining research papers. However, having read through each individual paper, I was able to exclude those studies that did not rank the listed factors. The rankings were important since they constituted the basis upon which I would be able to plot the kiviati diagram. The final selection that remained consisted of 40 papers which were then codified with respect to their publication year, the journal in which they were published, and the type of cause of cost overruns and time delays that were discussed. I was then able to determine the average rank order by calculating the mean value assigned to each of the categories for each given time frame. For example, in the period 1985-1990, each one of the research papers in the selection from that time period listed financial factors as the main cause for overruns. In the period 1997-2002, on average, the papers ranked financial factors to be the

fourth most important cause for overruns. I then plotted a kiviati diagram in order to visualize the data.

Continuing on from the findings obtained in Paper I, Paper II examined the cost and time overruns in light of the dynamic capabilities concept. I was particularly interested in the type of causes that the dynamic capabilities concept could address. In determining these types of causes, I examined the project documentation of a large Swedish public client organization (PubClient). The data was collected from PubClient's internal documentation. According to the procedural guidelines of PubClient, an investment portfolio (including both investments and refurbishments) of all projects needs to be established that include all ongoing projects, their initial budgets and cost prognoses. It also needs to include potential cost differences between the actual costs and the initial budgets. In cases where the cost differences exceeded 10 million SEK, a description is given as to why those overruns occurred. These descriptions are reported in the project documentation at the time of carrying out the projects. If a particular project is expected to go over budget and further funds are needed, the project manager for that project is required to request additional funds for the completion of the project. This is done by filling out a form which requires the inclusion of a description of why the cost overruns occurred, the precise figures for the initial investment, the total cost of the project and the deviation from the planned budget. The document shall also include a proposal for decision on how to proceed. This form is submitted to, depending on the amount, to either the head of the project management department, the committee of PubClient, or to the city premises secretariat. The first representing an administrative level and the latter two representing political levels.

The request for additional funds is either granted or denied, the basis for the decision is documented and a brief explanation is given for why the project should be allowed to continue and receive additional funds, how to proceed with adaptations in the budget, or why it should cease to be funded.

PubClient's project investment portfolio, which I examined, contained all of PubClient's ongoing projects (315) up until January of 2019. Removing all entries of projects that are missing figures for their budgets result in 146 projects. The remaining data includes the type of project, date of initial funding, initial budget, forecasted budget, and actual costs at the date in which the project investment portfolio was updated (2019-01-28). From this initial dataset, only construction projects that had reported cost overruns were considered. This reduced the number of projects down to 76 projects (Appendix I). Following this, I calculated the average cost overruns (μ) for all projects that were affected by cost overruns by dividing the sum of all cost overrun scores present in the dataset ($\sum X_i$) by the total number of projects (N) in the dataset [$\mu = (\sum X_i) / N$].

The standard deviation (σ), measurement of the spread of the scores, was similarly calculated by $\sigma = \text{sqrt}[\sum (X_i - \mu)^2 / N]$.

The factors that caused the overruns were determined from the project documentation. For each of the construction projects that had reported cost overruns, I then examined the written descriptions from PubClient's project investment portfolio explaining the reasons for incurring the reported cost overruns. From this, I was then able to group the most commonly reoccurring causes stated in the project documentation for cost overruns.

3.2 Study II

The design for Study II began in November of 2014 after which I had just presented two conference papers (Adam et al. 2015a/2015b) containing preliminary results from one of the literature review studies conducted in Study I. At the time, I was particularly interested in if and how the dynamic capabilities concept could be used to explore the challenges facing public construction clients. In order to test the applicability of using a framework that utilized the dynamic capabilities concept, I sought to locate a suitable case. The case that was chosen was PubClient (see chapter 1.7.1) which I regarded as a suitable case due to the organization being a public construction client that had undergone a major organizational restructuring in response to external pressure. This process of change continued even after the studies that I conducted, particularly with regards to the organization's strategies and the management of their properties (Svensson, 2018). The period of organizational restructuring was particularly interesting in light of the dynamic capabilities literature which places an emphasis on the external environment as the impetus of change through which organizations need to adapt by building and reconfiguring their internal and external capabilities (Eisenhardt & Martin, 2000; Teece, et al., 1997).

Study II therefore examined the management of capabilities in a client organization through the lens of the dynamic capabilities' framework of Teece et al. (1997, 2012). Specifically, I examined the process by which PubClient sensed, seized and transformed opportunities in a manner conducive to the organization's overall goals. An exploratory case study approach was adopted which included the use of interviews and an examination of internal reports, PMs, documents such as meeting notes and documents covering decisions that documented and described the development of PubClient.

I opted for a single case because the case of PubClient was somewhat atypical in that it represented a client organization that had undergone *extensive* and *repeated* organizational restructuring as a result of having adapted and reacted to external factors. It is this aspect that is of interest in the case study, an aspect that does not seem to exist to the same extent in other similar organizations. PubClient is in this sense an atypical case for which a single case approach may be suitable (Siggelkow, 2007).

3.2.1 Interviews

Seven interviews were conducted in Study II of which four interviews were with managers of the different units of PubClient. The criteria for choosing interviewees was based on selecting individuals in a managerial position who had been present at the time of PubClient's

organizational restructuring in 2008. This criterion undoubtedly limited the number of personnel who could be contacted. However, it also ensured a purposive selection that only included individuals with expertise in their professional areas and who had witnessed first-hand the changes in their roles and in the organization. This was important as the changes in focus had affected both the professional roles and responsibilities as well as the structure of the organization. This also allowed them to describe and have an understanding of the organizational setting in which the decisions that lay behind the restructuring were taken. The group was small, there were not many individuals remaining in the organization that had experienced and followed the development first hand. Due to their long-term involvement with PubClient, their responses were therefore considered valuable in terms of covering the changes that the organization underwent. This is in line with Romney et al. (1986) who argue that having a small number of participants is justified when the participants possess a higher degree of expertise on the research topic. The results are particular, and the data cannot be viewed as generalizable to all client organizations, however they cover the situation studied in the case. These four interviews were then followed by an additional three interviews via telephone with senior personnel in three different public construction client organizations, in order to gain an outside perspective of PubClient. These three interviewees represented client organizations that operated in the same municipality as PubClient, who had worked together with PubClient in the past, and who were therefore able to provide a complementing view on the development of PubClient.

Each interview took place either in the respective offices of the interviewees or by means of telecommunication software lasting on average between one and two hours. The interviews were conducted using a semi-structured basis as a way to allow the interviewees to freely develop their views whilst maintaining a set of core questions to make sure that a single coherent narrative could emerge. All of the interviews followed a semi-structured design in order to allow for new ideas to emerge throughout the duration of the interview whilst adhering to a set of predetermined themes. The purpose of using this approach was to allow for an exploration of the topic at hand without adhering stringently to any preconceived notions. The interviews were recorded and transcribed in order to provide a verbatim record of what was said.

3.2.2 Document analysis

Document analysis refers to a systematic procedure for reviewing or evaluating documents which requires that the data be examined in order to elicit meaning, and develop empirical knowledge (Bryman, 2011; Corbin & Strauss, 2008). Considering that organizations studied in this thesis were public organizations, the right to public access (Regeringen, 2009) allowed for internal documents to be obtained through their websites or via contacting the organizations. In addition to this, various publicly available (described below) folders, reports and studies that documented the organizations' activities and development were also used in order to provide a comprehensive description of how the organizations operated.

The documentation that was available to me was both internal documentation made available by PubClient as well as published external documentation. The internal documentation included action plans, notes from meetings, internal PM:s and audits as well as documents related to projects such as project order requests, reports and documentation of decisions. The external documentation was comprised of reports that were either published directly by the municipality or in collaboration with the municipality. Often these were descriptions and evaluations of changes in the organization. I was particularly interested in the development of the organization's internal structure and the effects of the organizational change on the development of the capabilities of its employees. The view which emerged by studying PubClient's documentation was further supplemented with interviews with key personnel who were present throughout the organization's development (see above). The initial analysis searched for notes and comments that pointed to, documented or described the development and restructuring PubClient had undergone. This included studying documents that were written at the time of the restructuring as well as retrospective accounts written at a later date like reports and evaluations. From these documents, I was then able to have an account of what had initiated the restructuring as well as identify and study the consequences that it had on the studied organization. The view that emerged through examining the documents was corroborated through the interviews that I conducted with senior personnel at PubClient who gave an account similar to that which was identified from the documents.

3.3 Study III

Study III began in November of 2016 and it was based on a case study of an association made up of 16 client organizations/divisions, from the county councils in Sweden (see chapter 1.7.2). I conducted the study in collaboration with the Centre for Healthcare Architecture (CVA), a research center at Chalmers University of Technology which serves as an academic center that conducts research pertaining to healthcare facilities. My own interest into this topic was driven by the possibility to study multiple client organizations that were in the process of debating and developing their internal processes for delivering public healthcare facilities. They were doing so because they had viewed their planning processes to be lacking structure as well as having been hampered by difficulties in getting measurable requirements from healthcare professionals. The processes were also inadequate for the volume of projects the counties were managing, the largest construction volume since the 1980s (PTS, 2018).

3.3.1 Interviews

17 interviews were conducted with primarily project managers and facility managers of the studied client organizations in Sweden, and an additional interview with a Norwegian client organization (Sykehusbygg), as well as an interview with an independent consultant familiar with the processes (regarding healthcare construction) of both countries. The purpose of this was to compare the challenges of the studied client organizations in Sweden in light of the equivalent client organization in Norway which had gone through a similar process of change

but with a different outcome (Norway opting for a centralized structure instead of a decentralized structure as Sweden had had since the 1990s). Interviews were conducted at the respective offices of the interviewees in cases where a visit was possible. However, in cases where the interviewees were located at counties which required lengthy travel, the interviews were instead conducted over the phone. Each interview lasted on average between one and two hours. The interviews were conducted on a semi-structured basis in order to allow the interviewees to freely expound their views whilst retaining a set of core questions to ensure that a single coherent narrative could emerge.

Once the interviews had been finalized, they were transcribed and then coded with the use of NVivo software. The coding of data constitutes a key element in the process of qualitative data analysis (Bryman, 2011). I conducted the coding by going through the text and marking sequences of text with markers (keywords), indicating a reoccurring idea (e.g. planning process), and then collecting the sequences of texts that corresponded to those markers. Through this, I could then identify themes and examine how the interviewees differed or agreed with respect to the ideas discussed in the marked text sequences.

3.3.2 Workshops

Two workshops were conducted as part of Study III (Appendix II). These workshops were conducted in order to gain feedback from the studied organizations in Paper IV. The workshops occurred at two separate occasions in collaboration with the Centre for Healthcare Architecture (CVA). The workshops focused on the development of better support systems for handling the construction process of healthcare facilities. In particular, the aim was to produce a process chart or support system that would provide quality assurance and facilitate the construction of healthcare facilities, specifically in regard to the early phases of a construction project where requirements are set. This included systems for reporting experience feedback and collecting data in the form of questions, checklists and working procedures as well as developing a more transparent method for undertaking decisions that allowed for accountability.

The first workshop which I ran alongside two other researchers was conducted on the 20th of September 2017 and included 22 participants, the majority of whom were representatives of different county organizations. The second workshop (31th January 2018) had 20 attendees. Each workshop was held for a duration of six hours including breaks. The participants of these workshops consisted of the individuals who had previously been interviewed as well as other members of their respective organizations in addition to individuals who operated in different counties. The purpose of doing so was to gain their input with respect to the results that had been gathered thus far. I presented preliminary results from the ongoing study (Paper IV) and received feedback on those results.

The workshops consisted of group discussions, presentations and group activities that were designed to foster both a generation of ideas as to how to improve the prevailing process for

constructing healthcare facilities as well as to offer a review of current practices. Group discussions were recorded at both workshops.

The first workshop began by allowing the participants to discuss amongst themselves about the challenges that they had faced, and through that discussion, produce a process chart that highlighted both the current challenges that they face in their construction process as well as to suggest possible tools to ameliorate those challenges. The second half of that workshop consisted of presentations that explained how I and the rest of the research group had perceived those challenges based on the interviews that had been conducted. This was followed by two other presentations, the first detailing how the Municipality of Gothenburg solved their comparable challenges by developing a shared set of construction guidelines (Adam, et al., 2017). The second presentation was performed by a representative of Sykehusbygg who discussed the centralized solution that had been established in Norway for the planning and construction of healthcare facilities. The presentations were given after the initial discussion session so as to not influence the responses of the participants.

The second workshop began by recalling the discussion from the previous workshop. The format of this workshop was similar to the first one, in that it included presentations and group activities, however, the second workshop focused more on outlining, through a co-design approach, possible solutions for the challenges that had been brought up in the previous workshop.

3.3.3 Feedback questionnaire

Feedback questionnaires were conducted for Study III in order to assess if my portrayal of the challenges of the studied organizations were consistent with what the participants of the workshop had experienced. During the first workshop (Paper IV), the participants were asked to fill out a questionnaire that sought to evaluate their opinions on the construction process in their respective client organizations. The questionnaire included a sample size of 15 people and it was conducted once the preceding interview study had concluded. The purpose of the questionnaire was to gain feedback from the attendees as to whether the findings that I had conveyed in the study (Paper IV) had constituted an accurate portrayal of their organizations. The responses gained from the questionnaire corroborated the portrayal of the case. The questionnaire along with the workshops thus provided an iterative function, confirming ongoing findings, and allowing for a modification of the research results based on the inputs received through those means.

3.3.4 Document analysis

The interviewees provided samples of the documentation (i.e. checklists and descriptions of procedures) that they use for planning, procuring and managing their projects. Of particular importance was the way by which these organizations justified that they possessed the necessary capabilities to deliver projects within the constraints of the stated project goals.

The documents that I reviewed consisted of those that the studied client organizations used for planning, procuring and managing their projects. The documents described the approaches taken by the client organizations when managing projects, from feasibility studies to production. Specifically, these documents consisted of feasibility studies, checklists and guidelines, decision making charts, documents describing delimitations and responsibilities and had formats varying from slideshow presentations to reports covering construction-related challenges of the studied Swedish client organizations. Additionally, similar type of documents had been obtained from the Norwegian Sykehusbygg which showed process charts of Sykehusbygg's organization and planning guidelines (Sykehusbygg, 2017). These documents were used to corroborate the portrayal of Sykehusbygg given by the interviewee representing Sykehusbygg and the portrayal given by an independent consultant familiar with Sykehusbygg's processes.

3.4 Limitation to the studies

Although this thesis seeks to contribute to the wider research landscape involving dynamic capabilities in a construction context, it ought to be stated that there are limitations as to its applicability. Aside from the already mentioned self-evident limitation regarding the specific geographical context in which the studies have been performed (Scandinavia, specifically Sweden) it would also be prudent to mention that the applied research methodology involving case studies does not necessarily lend itself to extrapolations. However, at the very least, the studies included in this thesis constitute stepping stones for future research that seeks to understand the relationship between the challenges faced by construction clients and the capabilities necessary to overcome those challenges. In doing so, we also learn about the applicability and challenges when trying to grasp how dynamic capabilities can be articulated. It is argued that the findings presented in this thesis, with caveats around the specific context, could help to inform future research in this endeavor.

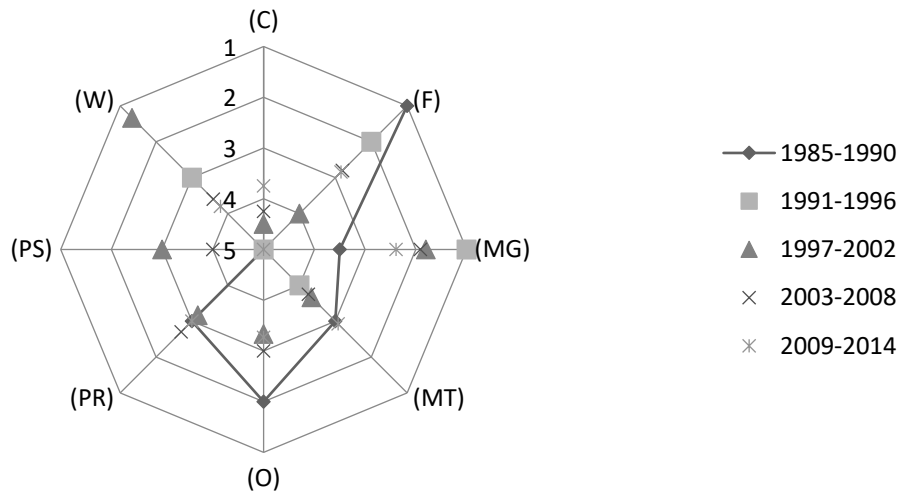
4 Summary of papers

Paper I: Adam, A., Josephson, P.E.B. and Lindahl, G., 2017. Aggregation of factors causing cost overruns and time delays in large public construction projects: trends and implications. *Engineering, Construction and Architectural Management*, 24(3), pp.393-406. [Published]

Purpose: This paper explores the impact that cost overruns and time delays have on large public construction projects. The paper seeks to show how past and current research of factors causing cost and time overruns in large public construction projects have shifted in terms of which factors are most important in causing overruns to occur.

Design: The study sought to analyze the most important factors causing cost and time overruns in public construction. This analysis was based on a literature search that targeted research articles that ranked causes of cost and time overruns of large public construction projects. This paper provides average rankings of the causes of cost overruns and delays in large public construction projects. This was based on having gone through a literature selection of 3,833 research articles that dealt with cost and time overruns in public construction, filtering it down to 40 articles that used a similar methodology for ranking cost and time overruns in public construction. I was then able to aggregate the reported rankings of these 40 articles into eight categories, the result of which is shown in Figure 3.

Findings/discussion: The following figure (Figure 3) shows how the research literature has ranked the different causes for cost overruns and delays from 1985 to 2014 (using a Likert scale of 1-5, with '1' constituting the highest rank). Aggregated rankings of the causes of cost overruns and delays are reported, i.e. an average of the different rankings listed in the selected journal papers. These indicate a strong emphasis on the management aspect (e.g. control and monitoring) as a primary cause of cost overruns and delays; in the majority of the studied time periods, factors relating to management were ranked between $1 \leq r \leq 2.39$ (the highest rankings of any category) where 'r' denotes the rank. Additionally, there seems to be a trend in recent years toward deemphasizing the role of financial factors (such as poor financial planning and price increases) in explaining cost overruns and delays. As can be seen in Figure 3, later studies (between the years 2009-2014) assign a lower rank ('5') to financial factors than older studies (1985-2008). Furthermore, factors relating to communication (C) and psychology (PS) have been assigned low ranks (corresponding to values of $3 \leq r \leq 5$). However, this does not necessarily mean that factors relating to communication and psychology have little impact on causing cost and time overruns. Instead, it could be that factors relating to communication or psychology were the underlying causes behind other factors such as 'improper coordination' or 'poor cost estimation', both of which had been categorized differently in the papers that I examined. This highlights a problematic issue when determining the causes of cost and time overruns, namely that it is not always possible to determine the initial underlying cause.



C = Communication, **F** = Financial, **MG** = Management, **MT** = Material, **O** = Organizational, **PR** = Project
PS = Psychological, **W** = Weather

Figure 3: A kiviati diagram illustrating trend data for the causes of cost overruns and time delays in construction projects based on the sampled literature, ranging from 1985-2014. The bolded line shows the values for the first interval (1985-1990).

Cost and time overruns have constituted a recurring challenge for construction organizations. The data illustrated in Figure 3 is in line with the research literature suggesting that the construction-related challenges that construction clients have faced have persisted over time (Akinci & Fischer, 1998; Memon, et al., 2011), although the kiviati diagram shown in Paper I would suggest that the occurrence of cost overruns and delays has been consistent over time but the explanations for their occurrence have varied over time (Figure 3).

The differences of opinion in terms of *which* factors weigh more heavily in generating overruns may indicate that these concepts may not have been fully understood, therefore generating a large number of explanations as to why they occur. It may also suggest something entirely different, that even though the causes of these challenges are well understood on their own, the interconnectedness of stakeholders and individual processes in each construction project makes it unfeasible to state with certainty which factor stands as the primary cause. This suggests that we need to move away from conducting studies that seeks to rank individual factors determining the cause of cost overruns and delays in construction. For one thing, these studies are often based on questionnaires that retrospectively expects respondents to provide what they believed to have been the primary causes of cost overruns and delays even though such a retrospective account might be tainted by the subjective biases of the respondents. What if, as Flyvbjerg et al. (2013) suggests, the underlying cause of these occurrences stem from human psychology (e.g. optimism bias), would there be any way to measure or even qualify such a thing? I, for one, am not entirely convinced there would be.

The claim by Flyvbjerg that optimism bias may constitute the underlying cause of cost overruns is certainly not without merit as Altshuler and Luberoff (2003) previously noted; they argued

that the very notion that the technological tools and economical models that have been used in construction have become more sophisticated over time, while cost overruns and delays have persisted, constituted striking evidence in favor of the answer to these challenges not lying in the realm of technology or economics but rather in psychology and politics. To suggest that there are aspects of this challenge that are not quantifiable is not the same as conceding the challenge altogether. Indeed, it seems to me that the most feasible course of action would be to adopt more rigorous construction processes to respond to the aspects of these challenges that are addressable (e.g. logistics, change orders, poor site management.) whilst being cognizant of the psychological biases that one might have when producing cost estimates.

Although it would be accurate to state by identifying and then ranking the factors causing cost overruns and delays, this would allow for comparisons to be made; it would also be accurate to note that doing so only provides an incomplete account. For one thing, these studies tend to identify, retrospectively, what the respondents of surveys or interviews believed to have been the most common factors causing a cost or time overrun. This does not necessarily mean that these factors are the most impactful in causing these overruns to occur although that is a possibility. Indeed, it may very well be so that a factor that is not easily identifiable may constitute the most pernicious in terms of the negative impact that it has on the delivery of the project. This paper argued that there was a need for a shift in the research literature to instead focus on both qualifying the impact of an identified cause, and to measure cost and time overruns based on empirical data gathered at the initial source, i.e. from stringent project documentation of cost overruns and delays at the moment at which they occurred.

This would represent a shift in approach when measuring cost overruns, from merely repeating the retrospective accounts given by respondents based on what they assumed to have been the most impactful to instead regarding the actual data recorded in the project documentation at the time of its occurrence. Having this stated, although I would contend that the gathering of the data for cost overruns and delays from project documentation instead of through retrospective interviews may enable us to gain a clearer picture of the challenges. It would not however do away with all the uncertainties that relate to how we assess these factors to begin with, in terms of their magnitude and perhaps most importantly, how these factors interconnect with each other, a challenge that is still in need of rectification.

Contributions: This paper contributes to the literature on cost and time overruns in public construction by showing how the prevailing thoughts regarding which factors are most important in causing overruns to occur have shifted in the past decades. I conclude the paper with a discussion on the viability of ranking factors to determine which are the most important in causing cost and time overruns. This discussion is the starting point for the following paper, Paper II, where I review the prevailing approaches for studying cost and time overruns, and then contrast these approaches with utilizing the dynamic capabilities concept to deal with overruns. In order to determine which causes of overruns that could be addressed by the

dynamic capabilities concept, I examine data for the causes of cost overruns from the project documentation of a client organization in Sweden (PubClient).

Paper II: Adam, A. Methods for managing cost and time overruns in light of the dynamic capabilities concept. *Engineering, Construction and Architectural Management*. [Accepted for publication / review process]

Purpose: This paper seeks to discuss what applying a dynamic capabilities approach to examine overruns might entail as opposed to using conventional methods for approaching the subject. An examination is made as to how the eight categories of causes that were identified in Paper I can be understood with respect to the dynamic capabilities concept.

Design: I examined the project documentation of PubClient, specifically their project investment portfolio for all projects up until January of 2019. I then calculated the projects' cost overruns from the reported cost figures and compiled the causes for overruns based on the explanations provided in the project documentation. The reported causes were then grouped into relevant categories and this constituted the basis for an argument regarding the type of categories of cost overruns that dynamic capabilities could address. The paper seeks to bridge the dynamic capabilities concept with the literature concerning cost and time overruns. The study was based on a literature review of the dynamic capabilities literature as well as the literature surrounding cost and time overruns in public construction.

Findings/discussion:

From the initial selection of 146 projects that had reported budgeting data, 76 projects had reported cost overruns (52.1%), and of those projects, the average (mean) cost overrun was calculated to be 39.3% with a standard deviation of 60.0%. The high value for the standard deviation reflected the large span in cost overruns for the included projects, ranging from 0.01% to 413%.

The project documentation showed that the most commonly cited factors causing cost overruns were those that related to client-initiated design changes and improper estimation of the scope of the project. The second most commonly cited reason referred to price increases or changes in market values (i.e. increased production or labor costs) that were higher than expected. These were consistent with the main causes of overruns reported by Kaming et al. (1997).

Having examined the cost overruns figures that had been recorded in the project documentation, it would seem that the most commonly cited explanations for their occurrence were factors that related to the categories of management, organization and project. Factors relating to areas such as communication or psychology (e.g. optimism bias) are not referred to in the project documentation, even though numerous studies have shown these to have a considerable impact on cost overruns (cf. Flyvbjerg et al. 2008/2009). It may be that these factors are the underlying causes behind the factors that were reported in the project documentation, but since they are not easily identified or measured, they are not mentioned in the reports. It would not appear to be possible to quantifiably determine if optimism bias was a factor that influenced the occurrence of the cost overruns. Instead, the type of factors that are mentioned in the project documentation seem to relate to those that can be attributed to project coordination and setting the project

requirements/scope in the early phases of the project. In the dynamic capabilities literature, these would relate to what Winch and Leiringer (2016) describe as ‘governance capabilities’, the type of capabilities that addresses the interface between the temporary project organization and the permanent organization. These include capabilities that relate to defining the scope and developing stage gate processes that are meant to reduce unnecessary client-initiated changes.

An argument has been made that the concept of dynamic capabilities addresses issues that supersede the individual causes that produce cost and time overruns. This paper has also questioned the applicability of management models that purport to manage cost and/or time overruns by arguing that these methods address only a certain segment of the factors that cause overruns to occur. Furthermore, there are indications that this group of causes is smaller in proportion to causes that are immeasurable, and if that were to be the case, it would put further emphasis on the diminished ability of these models in managing cost and time overruns.

Instead of forecasting costs or time at a granular level, dynamic capabilities address strategic matters that relate to the organizational level. Thus, introducing the dynamic capabilities concept to examine overruns would entail that one considers a more comprehensive view that considers how the organization can utilize its internal resources.

Figure 4 shows the applicability of contemporary cost and scheduling tools for dealing with cost overruns with respect to the dominant causes of cost overruns which has been identified in the literature. The causes that are labeled under “A” and “B” differ depending on whether they can be measured. Conventional forecasting models that seek to address overruns tend to target those in Group B but do not typically address those in Group A. Furthermore, there are no studies that have been able to determine the proportion of overruns that occur in construction projects that belong to the group of causes in Group A and those that belong in Group B.

The relative distribution of these two groups, the measurable and the immeasurable, carries significant repercussions on the efficacy of any model that purports to forecast or curb cost and time overruns. Indeed, if cost overruns are predominately a matter that occur due to optimism bias or strategic misrepresentation, as suggested by Flyvbjerg et al., (2013), then using conventional forecasting models will have either diminishing or insignificant effects since they only address the auxiliary causes.

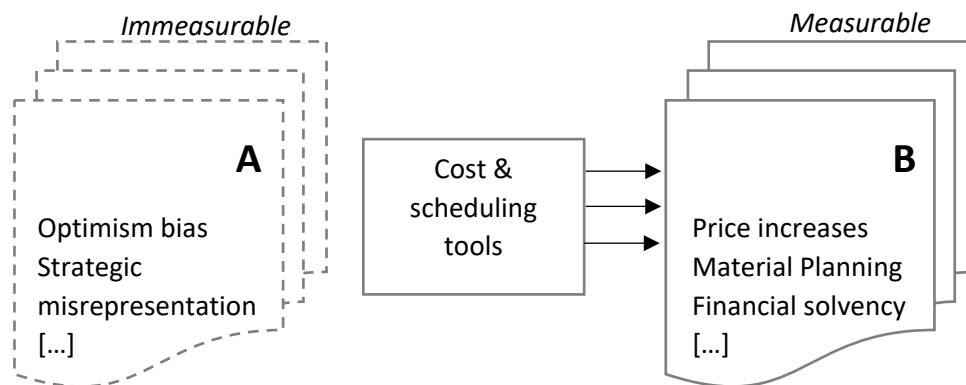


Figure 4: Immeasurable (A) and measurable (B) causes of cost and time overruns (Paper II).

To counteract optimism bias, Flyvbjerg (2008) suggests the use of a model entitled Reference Class Forecasting (RCF). Based in part on an earlier paper by Kahneman and Tversky (1979), the RCF model seeks to predict the outcome of a planned action based entirely on actual outcomes of past similar project to that being forecasted. According to Flyvbjerg, this would counteract optimism bias since the forecaster assumes that the cost escalation for the planned project will follow the same trajectory as that of the reference project. In Paper II, I argue that the RCF model is not without its limitations. For one thing, it requires the presence of an extensive database of past projects that can function as references upon which new cost estimates can be made. Aside from many organizations in the construction industry lacking such databases (Mulholland & Christian, 1999), even if they were to have compiled past experiences from previous projects, there would still be a need for a qualitative assessment to occur when finding a good reference project that is similar to the new project being forecasted. Finding a suitable reference project could be difficult and the assessment needed to locate that reference project would itself be a qualitative and immeasurable activity which would bring us back to the unpredictability mentioned previously. Thus, even if we were to ascertain that the methodology of RCF for assessing cost overruns is valid, it would still rely on input data that is to some degree qualitative and immeasurable.

Moreover, the RCF model only purports to curb cost overruns that relate to optimism bias but does not address those that relate to strategic misrepresentation. Therefore, if a cost overrun had occurred due to strategic misrepresentation, the RCF model would not have been able to take that into account when producing the forecasts. Much like the distinction I made earlier between the immeasurable and measurable factors of cost overruns, there is no data in the research literature as to how common strategic misrepresentation is compared to optimism bias. If it were to be shown that strategic misrepresentation is a significant cause of overruns (in that a large proportion of overruns occur due to it), that would diminish the usefulness of the RCF model since it cannot account for strategic misrepresentation.

In Paper II, I argue that applying the dynamic capabilities to examine cost and time overruns may address overarching organizational mechanisms that result in overruns – but do not address

individual causes specifically. Unlike conventional methods for estimating overruns, dynamic capabilities function at a different level of abstraction, see Figure 5.

The lower the level of abstraction of a concept, the more it relates to factors that are immeasurable in nature. Whereas cognition and learning constitute the foundational parts by means of which any form of organizational endeavor is taken, studies of these concepts involve tacit elements that are difficult to synthesize into tangible operative guidelines that can reduce overruns. On the opposite side of the scale, cost and scheduling software can directly relate to curbing cost overruns in a tangible sense but they cannot address the immeasurable factors that cause overruns to occur. The proposed argument here is that the level of measurability of a factor that causes overruns corresponds to the level of abstraction of the concept meant to address the overruns.

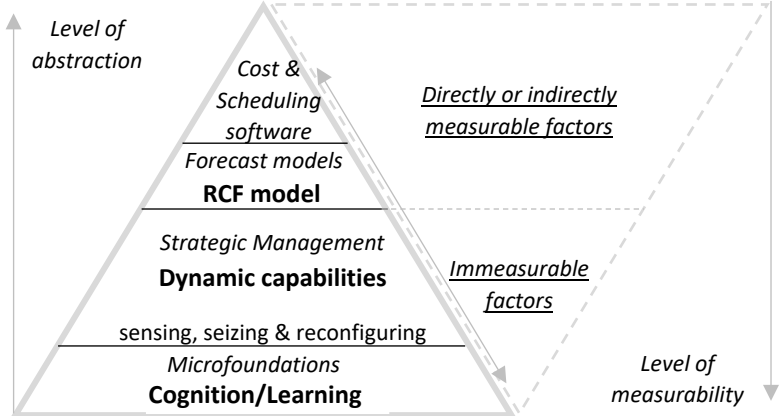


Figure 5: Approaches to managing overruns in terms of level of abstraction and measurability

The following table illustrates the eight categories that were identified in Paper I as causes of cost and time overruns, with examples of what authors in the research literature have identified as examples of dynamic capabilities relating to each of these categories. Although dynamic capabilities relate to certain categories, it would not seem possible to explicitly link a specific cause of overruns with a specific dynamic capability that counteracts that overrun. Instead, in Paper II, an argument is made that dynamic capabilities function on a lower level of abstraction which allow managers of organizations to consider ways in which they can continuously renew their organization in pursuit of increased performance. This differs from approaches that function on a higher level of abstraction, such as cost & scheduling software, that address overruns (that are directly or indirectly measurable) in a tangible sense.

Table 5. Causes of cost overruns and delays, and relevant dynamic capabilities.

<i>Category</i>	<i>Examples of causes</i>	<i>Dynamic capabilities</i>
Communication	Lack of communication between contractors and clients	Enabling cross-functional, cross-hierarchical, cross-cultural and cross-technological exchange of information and knowledge (Lawson et al., 2001)
Financial	Financial solvency Price increases (inflation)	Acquisitions enabling organizations to reconfigure their mix of resources (Karim and Mitchell, 2000)
Management	Poor site management Inadequate managerial skills Client initiated change orders Inadequate design specs Rework	Modification of contracts depending on the situation (Kuuluvainen, 2012). Alliancing management (Eisenhardt and Martin, 2000)
Material	Shortage of equipment Poor material planning	Product development (Eisenhardt and Martin, 2000) Modernization of machines in response to changing demands (Kuuluvainen, 2012). R&D projects (Helfat, 2007)
Organizational	Unsuitable management structure Poor organization structure Poor process procedures	Corporate diplomacy (i.e., the ability to win the hearts and minds of external stakeholders) (Henisz, 2016) Organizational ambidexterity (O'Reilly & Tushman, 2008)
Project	Project complexity Project duration	Portfolio management techniques (Davies & Brady, 2016)
Psychological	Optimism bias Deception	n/a
Weather	Harsh weather conditions Unforeseen ground conditions	n/a

Contributions: The paper contributes to the literature on cost and time overruns by classifying different approaches for managing overruns in terms of their measurability and level of abstraction (Figure 5). The paper seeks to provide a starting point for further studies that seek to study overruns using a dynamic capabilities approach by identifying the type of factors (causing overruns) that the dynamic capabilities concept could potentially address and the type of factors that is outside of its applicability.

The paper builds on Paper I by taking the categories of factors (causing overruns) that had been identified in Paper I and relating these to the dynamic capabilities concept (Table 5). The assessment of the type of capabilities that dynamic capabilities could address was done by examining PubClient's internal data containing cost figures from their ongoing projects.

Paper II has argued that although the dynamic capabilities concept will not be able to produce prescriptive guidance in terms of how a specific capability will cause a specific overrun, the concept nonetheless is useful in its ability to frame the question at an operations level by having managers concerned with how they can identify and then seize upon new opportunities. In the following Paper III and IV, the dynamic capabilities concept is used to study specific cases involving client organizations, focusing on the specific challenges that these organizations have faced.

Paper III: Adam, A and Lindahl, G. (2017). Applying the dynamic capabilities framework in the case of a large public construction client. *Construction Management and Economics*. 35(7), pp. 420-431. [Published]

Purpose: The purpose of this paper is to examine the development of capabilities in a client organization through the lens of a dynamic capabilities' framework. In particular, what was investigated was the process whereby a public construction client senses, seizes and transforms opportunities in pursuit of organizational improvement.

Design: This paper applied the dynamic capabilities framework proposed by Teece et al. (1997/2012) in a specific case involving one of Sweden's largest public client organizations, referred to as PubClient. The case focused on a major reorganization that had occurred of PubClient several years earlier and the individuals who oversaw that restructuring. Interviews were conducted with senior personnel who had been present prior to the reorganization. Three additional interviews were conducted with other client organizations to provide an outside perspective.

Findings/discussion:

The internal documents of PubClient provided an account of how the organization had undergone a period of major restructuring which led to PubClient combining its project division and its facilities management division while moving its strategic planning unit to the municipality's central strategic planning and management division. The restructuring also meant the creation of two separate support units that would focus on procurement and technical expertise.

According to those interviewed, the restructuring meant that the organization's project managers had to take on different roles than what they had in the past. Specifically, the project managers would had to consider a more focused approach to their assignments. In part, because project managers were now expected to transfer some areas of control to the newly created units that dealt with procurement and technical expertise. From a broader organizational perspective, the interviewees that I spoke to were strongly in favor of the restructuring and perceived it as a positive development. However, the interviewees mentioned that there had been concerns raised by some of the project managers who perceived the transfer of control as problematic, in that they had to relinquish part of their responsibilities as project managers.

It is impossible for a project manager to master all of the technical areas. It does not work like that. Particularly not with respect to the speed by which things occur today, that's my actual opinion. Herein, I feel, you can see the difference, how project managers experience these matters. It's in regard to how some can (i.e. project managers) let go of it but some have a major need to control. I believe that this has an impact. (Manager of the technical support unit)

The creation of the support units represented a move away from individuals being expected to manage all areas of a project themselves to a structure where collaboration with the support units became necessary. In addition, there was also a possibility for the project managers to join work groups focusing on specific issues, this was used as a support to the specialist units in their function as a hub of expertise. With the subdivision of responsibilities, each project now had external specialists having a say on parts of the projects' content. In some cases, this led to the strengthening of collaboration and in other cases, it led to competition, as described in the quote below:

Q: During 2008–2009, both the project managers and you were in the same organization, today you are your own unit. How would you say the impact of this has been, from being colleagues to being different units?

A: [...] I believe that it could have an impact that one becomes more distant from another, that one might perceive each other as, well, almost as competitors. One competes, I could certainly feel that way sometimes. (Manager of the technical support unit)

The interviewees further discussed how the restructuring had led to a reduction in the hiring of external consultancy services, particularly with regards to the core areas of the organization (e.g. procurement). The newly-established units could deal with much of what was previously outsourced to external consultants. This meant that the capabilities of running projects by PubClient had been consolidated through the introduction of the specialized units. The creation of the technical units meant that the project managers were not required to have a high level of expertise regarding specific technical details. The project managers were, however, required to formulate the technical requirements without relying on external parties.

Despite some of the challenges with the restructuring, the interviewees pointed to PubClient's willingness to change as an exemplary characteristic of the organization. When asked regarding the status of PubClient with respect to other client organizations in the municipality, the manager of the procurement unit emphatically claimed that it was "the best" and substantiated this statement by arguing that other client organizations in different areas of the country had begun a similar process of restructuring based on PubClient as an example. This view of PubClient as an exemplary organization was supported by the additional interviews that I had conducted with separate client organizations that operated in the same municipality.

The figure below demonstrates how PubClient can be viewed through Teece’s dynamic capabilities framework (Teece, 2012).

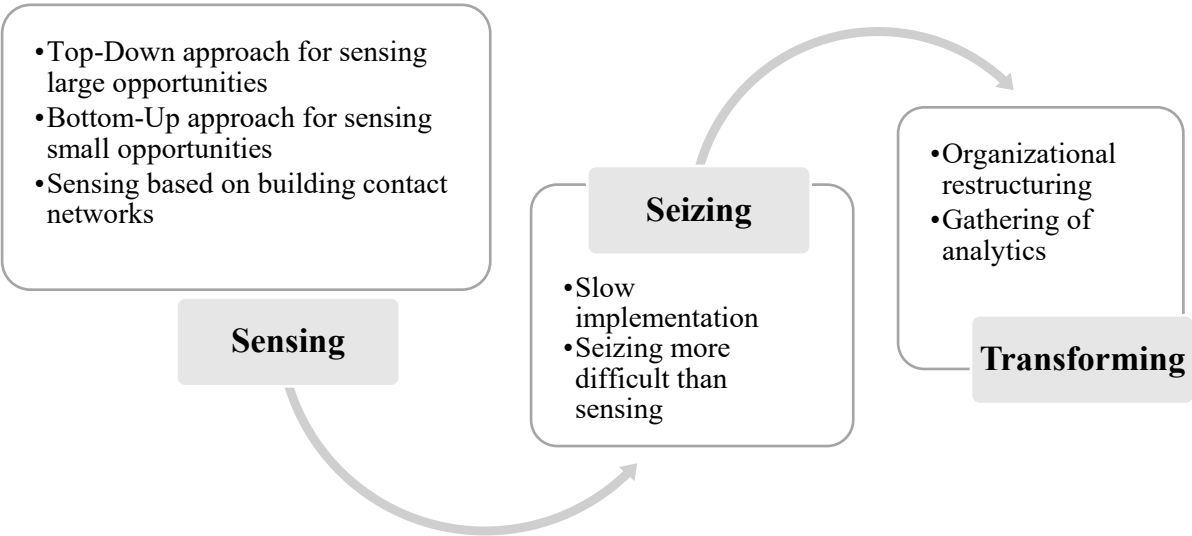


Figure 6: How PubClient senses, seizes and transforms opportunities.

In the case described in Paper III, it is suggested that PubClient sensed, seized and transformed opportunities in the manner illustrated in Figure 6. This is based on the responses received from the conducted interviews. Sensing refers to the identification and assessment of an opportunity (Teece, 2012). For PubClient, it seemed that larger opportunities were identified by upper management in a top-down approach whereas smaller opportunities were identified within the different units, in a bottom-up approach. One of the managers that had been interviewed mentioned that PubClient had routines in place that would allow members of the organization at the lower end of the organizational hierarchy to pass on suggestions that could eventually reach the central administration at the higher end of the hierarchy. Larger strategic decisions (such as decisions regarding restructuring) were however typically initiated from the top. In order to sense new opportunities, PubClient built an extensive contact network consisting of different client organization with whom they shared information on new developments. However, their contact network did not typically include individuals working in the private sector, which made it difficult for PubClient to identify changes that occurred in private companies. This was not consistent with Teece’s (2007) recommendation for widening the search horizon to sense new opportunities. Although it seemed that PubClient had allocated resources for sensing opportunities, seizing those opportunities appeared to be more difficult. This was indicated by PubClient having identified a number of important initiatives that were never implemented, according to managers who were interviewed. Furthermore, PubClient worked to continuously transform the organization by means of reorganizing its structure. The focus of the organization had changed from seeking to perform tasks correctly, to seeking to do the correct tasks, as exemplified by the manager of the procurement unit who noted:

There has been a lot of focus on doing right. [...] but there is a certain anxiety in the organization around these questions. [...] So we have a focus from doing right to doing the right things in order to extract business value and get the maximum benefit for the taxpayers' money.

This process of continuous renewal, in which the organization consistently sought ways to improve its organization (Teece, 2012), seemed to have been aided by the analytics they had gathered. By gathering analytical data on how they interacted with their suppliers including response rates for their tendering proposals, they were able to proactively improve their results. Examples given from the conducted interviews included how PubClient gathered data by mapping out the demand of their suppliers. When examining this demand data, PubClient noticed that certain contractors (e.g painting contractors) would conduct the majority of their work during the summer when they were in high demand which allowed them to charge higher prices. PubClient would therefore begin to make purchasing orders during the winter months when the contractors had lower liquidity which would allow PubClient to procure painting jobs in the winter that would then be carried out during the summer (and thus lower their costs). This type of decision was enabled due to the way that PubClient had continuously been working with finding ways to improve its organization.

Contributions: This paper sought to utilize the dynamic capabilities framework of Teece et al. (1997/2012) that had previously been used to study a contracting firm (Green et al., 2008) to study a public client organization. The paper illustrates how a public client organization can sense, seize and reconfigure its organization in pursuit of increased performance. Unlike Paper II, which discusses, on a theoretical basis, how the dynamic capabilities concept can be linked to a specific set of challenges affecting construction clients (i.e. overruns), this paper instead applies a given dynamic capabilities framework to study the specific challenges of a case. Although it was possible to apply the dynamic capabilities framework of Teece et al. (1997/2012) to the PubClient case, the framework was nonetheless not tailored to the specific settings of a construction client organization. For that reason, in Paper IV, I seek to instead examine a dynamic capabilities framework which was developed specifically for project-based organizations, such as those in construction.

Paper IV: Adam, A; Lindahl, G; Leiringer, R. (2019). The dynamic capabilities of public construction clients in the healthcare sector. *International Journal of Managing Projects in Business*. [Accepted for publication / In Press]

Purpose: The purpose of the paper was to examine the dynamic capabilities (specifically the subset of governance capabilities) of a case involving an association of client organizations, using the framework of Davies and Brady (2016).

Design: The study was based on a case study concerning an association made up of 16 client organizations/divisions, from the county councils in Sweden, which was then compared with a centralized unit for healthcare planning and construction in Norway. In total, 19 semi-structured interviews were conducted, alongside two workshops and a feedback questionnaire.

The figure below illustrates the research design for this paper:

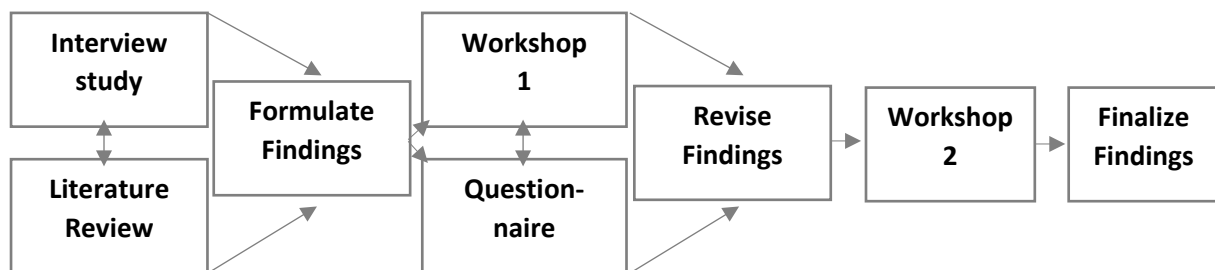


Figure 7: A schematic view of the research design for this study.

Findings/discussion:

The interviewees that I spoke to at the different Swedish counties described their respective operating procedures as either disorganized or lacking. Several interviewees mentioned that the different functions (property management, project management and operations) at their respective organizations had little to no communication between each other. The interviewees described the need for an integrated system that would enable the various functions to communicate and work under a shared system. The development of such a system was also the topic of both workshops, where the participants described the need for having clear guidelines and checklists that enabled for quality control and a streamlining of processes. Specifically, they discussed the need for developing checklists for the operations function that would contain a type of quality assurance that would enable them to evaluate their organization's operational needs. Those who had participated in the workshops were in agreement that external monitoring, experience feedback and knowledge acquisition were areas in need of development. Some of the interviewees called for the development of a specific unit at their respective organizations that would deal with those issues. These challenges were often tied to a discussion of resource allocation; the interviewees mentioned that there were often inadequate resources available for knowledge acquisition, and that no structured routines were in place for capturing experience feedback, repeating a common criticism of project-based organizations

like those in the construction industry (Bosch-Sijtsema et al., 2019; Lundkvist, 2015). There seemed to have been an absence of these routines at all of the different functions of the Swedish client organizations that I had interviewed. The interviewees further noted that their respective operational functions had no systematic way of taking in feedback from those working in the healthcare services who constituted the end users of the constructed healthcare facilities. The interviewees would further say that those possessing leadership positions at the hospitals administrative organizations were not sufficiently involved with the client organizations' property management functions which posed a challenge when implementing wider strategic plans relating to the long-term goals for the respective regions healthcare policies.

The interviewees further noted that the operations function did not allocate enough time and resources into the early planning phase. This became an important discussion point during the workshops that highlighted the need for developing procedures for the early planning phase (PTS, 2018). The feedback questionnaire that was conducted at the first workshop confirmed the responses given by the interviewees and reiterated the need to develop a support system for the early planning phase.

With regard to the project management function, several of the interviewees argued that their project managers did not have control of the construction process. As an example of what they perceived as a lack of control, the interviewees mentioned that the design process would start too early, before the organization had been able to conduct a proper plan and analysis of the project's objectives. Although the importance of providing structural aids such as templates and checklists was perceived as beneficial by all, one interviewee noted that processes, competence and communication were more important to get in place than structural aids such as checklists. The development of a 'planning culture' was viewed as crucial in order to get the project participants to cooperate. Developing such a culture would, as noted by the interviewees, require that resources be allocated for that specific purpose by the top management.

Based on the descriptions that I gained from the interviews, I argued in Paper IV that the challenges that the studied organizations faced and the necessary actions that needed to be taken, had been identified whereas the ability to then enact those changes had not been present. Figure 8 illustrates this by showing that at the individual level, the members of the studied client organizations had been able to identify new opportunities for change, but that the ability to seize on what had been identified had not been possible because those at the higher levels in the hierarchy (project financiers) had lacked the same awareness of the situation as those at the lower end of the hierarchy.

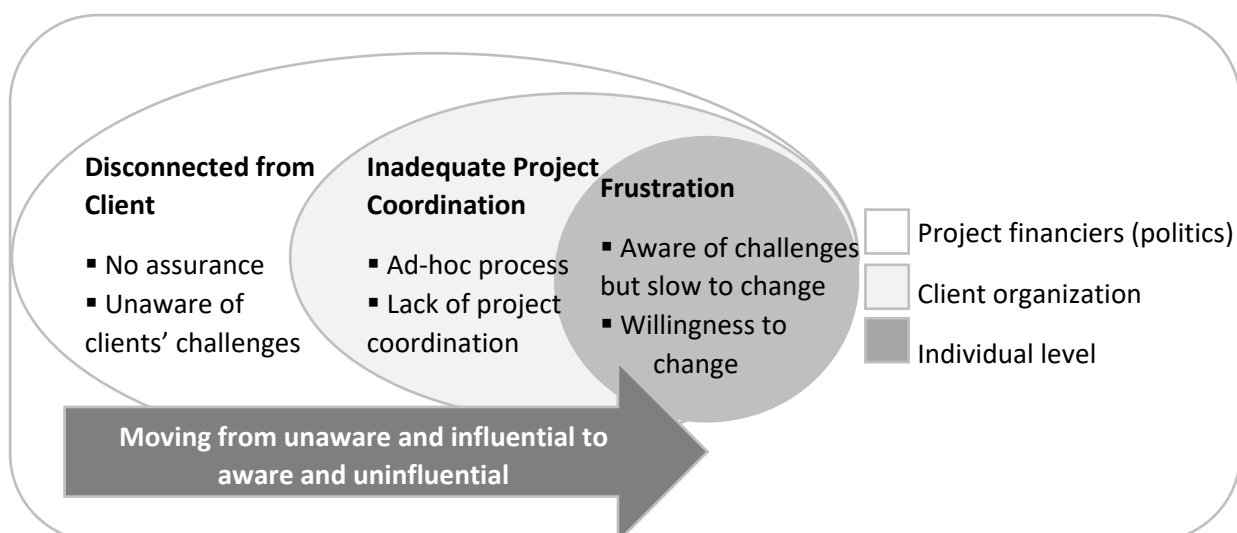


Figure 8: A social determinant model of challenges in healthcare construction in Sweden (Paper IV).

The figure above was developed based on the interviews conducted and illustrates the challenges of deploying dynamic capabilities in the PTS case and the inverse relationship between the level of awareness and influence. At the lower end of the hierarchy, the individuals who were involved with construction projects on a first-hand basis were regarded as more aware of the challenges that existed than those at the higher end of the hierarchy (project financiers) but they also lacked the influence needed to enact any meaningful change. This perception (illustrated in Figure 8) had been formed based on the interviews that had been conducted with several property and project managers at the respective counties and the perception was later confirmed by the attendees of the workshops. The opposite was the case for the project financiers who had the influence to enact change but were not generally aware of the challenges faced by project managers at the individual level. The mismatch between being knowledgeable of what needed to be done and lacking the ability to do it resulted in considerable frustration for those at the lower end of the hierarchy. Bridging the gap between what the project financiers are aware of and what those who are involved in delivering the project are aware of could help facilitate the delivery of the project. This would be in line with the precepts of Winch and Leiringer (2016) who stress the importance of assurance capabilities that enable client organizations to inform project financiers (local politicians) of the progress of the project.

The figure below (Figure 9) illustrates a contextualization of the framework of Davies and Brady (2016) based on the interviews conducted in Paper IV. Teece et al. (1997) argued that dynamic capabilities were in a sense contingent on the external environment. Davies and Brady (2016) placed this in a project-based context by arguing that organizations that employed such a structure needed to balance between exploration and exploitation approaches (Figure 2).

Below, I examine the studied case based on the aforementioned framework, while arguing that resource utilization also informs which approach the organization may employ (see Figure 9). In cases where the external environment is stable, then there would not necessarily be any need to deviate from employing existing operating routines. This argument is based on the conducted interviews with the representatives of the different counties who recalled that for many years, their operating routines had been adequate to deal with the demand for healthcare construction. However, the interviewees noted that once the external environment had changed by having a higher demand for healthcare construction, and a higher proportion of employees retiring (requiring a larger influx of young recruits), their established working routines became inadequate.

Furthermore, one of the interviewees, who had the role of head of strategic development at one of the counties, noted how the tools they would need to use in the present in healthcare construction were not needed in the past.

We need support tools in order so that a new [employee] can quickly learn and deliver on the basis of what task they have now [...] but we did *not need that a few years ago*.
[*emphasis added]

However, when the external environment is volatile, client organizations then have the option of enacting inter-organizational changes in the form of changing their internal operating routines to adapt alongside other organizations to the external environment. This is shown in the case involving the participating organizations of PTS which represented an attempt by a *decentralized* cluster of organizations to create stable working routines by adopting a standardized set of construction guidelines. Another possible option is to do as the Norwegian Sykehusbygg and instead seek to enact intra-organizational measures in pursuit of more efficient operating routines. Specifically, by having established a *centralized* unit that oversaw any substantial investment in healthcare construction, to counteract the destabilizing effect of the volatile environment. The centralized approach by which Sykehusbygg managed large construction projects was viewed favourably by the interviewees that I spoke to. This is exemplified by the following quote by an external consultant operating in Sweden who was familiar with the Norwegian healthcare sector.

What they are trying to accomplish in Norway with Sykehusbygg, where you have an organization with collective [centralized] expertise on these issues, which will support all regions when entering new projects, and they have their own capabilities that they have built up and they procure capabilities when they need it. I think that one needs to look at the Sykehusbygg model.

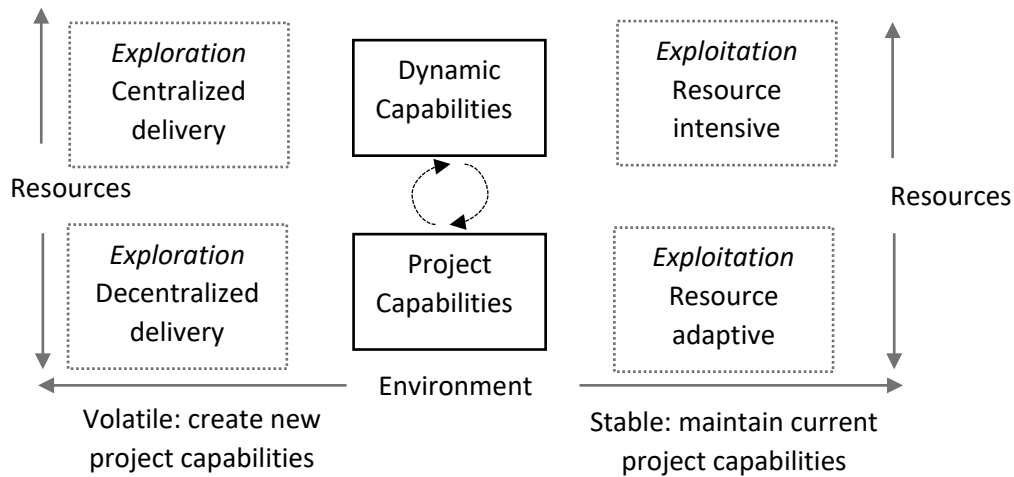


Figure 9: Approaches for exploitation or exploration of project capabilities depending on the volatility of the environment and resource utilization (compare with the framework of Davies & Brady, 2016, see Figure 2).

As mentioned previously, a challenge for public construction clients has been the contradicting demand for them to improve their organizational capabilities whilst simultaneously demanding that they utilize less resources to achieve that aim (Adukpo & Leiringer, 2016; Hood, 1991). Even though Davies and Brady's (2016) framework does examine the development of dynamic capabilities for project-based organizations, it is important to note that their framework (Figure 2) is not specific to construction clients. In the model presented in Figure 9, I suggest that the approach adopted by client organizations need to be informed not only by the level of stability of the external environment but also by the amount of resources that are utilized. In a more stable, non-dynamic environment, a more exploitative approach would suffice in which the client organization would continue to utilize existing operating routines. This would mean that if their current operating routines are mostly ad-hoc, without a structured way of working (and this has worked well in the past), there would be no need to adopt a more structured approach as this would entail that more resources would need to be spent. Although a standardized approach can be undertaken to ensure that the organization can be prepared for a more volatile future, an ad-hoc approach is less resource intensive and adequate in such an environment. However, if the environment is volatile, an explorative approach is then warranted and in such a scenario, an ad-hoc approach may actually be detrimental for the organization. A more suitable approach might then be to instead require that either decentralized working procedures be undertaken or that a centralized unit be formed that has the capabilities needed for adjusting to the changing environment.

Contributions: The previous paper (Paper III) concluded by suggesting that the framework of Davies and Brady (2016) could be more relevant for examining the dynamic capabilities of public construction clients than using a general framework of dynamic capabilities like that of

Teece et al. (1997). Moreover, I argued that future research needed to examine a “subset of the clients’ capabilities that can be more clearly described through empirical observations.” As a response to these suggestions, Paper IV builds on Paper III by utilizing a dynamic capabilities framework that is tailored for project-based organizations proposed by Davies and Brady (2016) in a case involving public client organizations in Sweden.

The paper contributes to the literature on dynamic capabilities and public construction. It indicates the need for a segmented approach for understanding how dynamic capabilities are managed in client organizations based not only on the level of stability in the environment but also taking into account the resources that are utilized. It is further argued that there is a need for a more granular research approach for studying the development of dynamic capabilities in a case-based setting, an approach that specifically links the development of dynamic capabilities with the precise antecedent actions that preceded them.

5 Discussion

In this thesis, I have examined the concept of dynamic capabilities and how it relates to the roles and functions of the construction client. The literature review on dynamic capabilities showed that although there was no consensus on how dynamic capabilities were defined, authors agreed that dynamic capabilities differed from ordinary capabilities in that: i) they constitute a set of routines that either create or modify an organization's resources in pursuit of increased performance and ii) that they are unique to each organization and path dependent (bound by each organization's history). The definition of dynamic capabilities that was used in this thesis was that of Teece et al. (1997). In this view, dynamic capabilities refer to the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments.

Authors that have utilized a dynamic capabilities approach to study a case have often found it to be difficult to grasp empirically (Priem & Butler, 2001; Williamson, 1999), suggesting that dynamic capabilities may instead be regarded as something that organizations do, as opposed to something that they have (Green et al., 2008). The approaches that I have taken in the appended papers are founded on the notion that it is possible to grasp dynamic capabilities empirically, but that doing so requires that one specifies which facet of dynamic capabilities that is being examined. In Paper II, I examined the applicability of dynamic capabilities with respect to the challenge of cost and time overruns and argued that dynamic capabilities could only address certain types of overruns. The causes that had been reported in the data that I examined (i.e. the investment project portfolio of PubClient) seemed to correspond to the type of dynamic capabilities that can be attributed to governance capabilities. These include capabilities that relate to defining the scope and developing stage gate processes that are meant to reduce unnecessary client-initiated changes. Furthermore, I argue that although dynamic capabilities relate to certain categories (e.g. organizational, project-related or financial categories), it would not seem possible to explicitly link a specific cause of overruns with a specific dynamic capability that counteracts that overrun. Instead, I argued that that dynamic capabilities function on a lower level of abstraction enabling managers of organizations to consider ways in which they can continuously renew their organization in pursuit of increased performance. This is different from approaches that function on a higher level of abstraction, such as cost & scheduling software, that address measurable overruns in a tangible model.

Following this, in Paper III, I examined specifically the activities of sensing, seizing and transforming in a specific case involving a client organization that had undergone a process of reconfiguring its internal and external resources as a response to external changes in the environment. Likewise, Paper IV, examined specifically a subset of dynamic capabilities that related to the client organization (Winch & Leiringer, 2016) and then utilized a dynamic capabilities framework specific to organizations that operate in project-based environments (Davies & Brady, 2016).

The difficulty of grasping ‘dynamic capabilities’ through empirical studies is essentially an extension of the difficulty of grasping ‘capabilities’ empirically. The elusiveness of the term ‘capabilities’ has been a difficult term to deal with in this thesis. Initially, I opted to conceive capabilities as tangible ‘things’ that can be readily identified and connected with the outcomes that they produce. This approach was not particularly fruitful as it became apparent that capabilities are embedded within the organization (Ambrosini & Bowman, 2009) and difficult to separate from one another, let alone establish causality in terms of how a particular capability can affect a particular outcome (e.g. cost or time).

A different approach to handling this issue is that of Winch and Leiringer (2016) who call for ceasing the search for the ‘best practices’ needed to produce a particular outcome and instead focus on explicating which actor in the project coalition is deploying which capabilities. In doing so, they advocate for the term *owner project capabilities*, which is based on the premise that the dynamic capabilities that owners require when investing in infrastructure and operating infrastructure services are different from the dynamic capabilities required by the project-based organizations that undertake the design and construction of that infrastructure. I would contend that this raises a number of questions that are relevant to the discussion in this thesis, the most important of which is: *at what level does the topic of capabilities belong?* Is it on the organizational level as Teece et al. (1997) and Eisenhardt and Martin (2000) have suggested or should capability development be regarded as part of continuous learning initiatives that occur on the individual level, as suggested by Zollo and Winter (2002)? There does not appear to be a clear answer to which path is the “better” option. Indeed, it may very well be that neither of the two approaches is ‘better’ than the other, but instead, that studying ‘capabilities’ or ‘dynamic capabilities’ on one of these levels merely allows for a *different* perspective and not necessarily a more *accurate* perspective of these concepts. One way of determining the level at which these concepts could be studied would be to differentiate between the level at which capabilities can be *developed* and at the level in which they are *managed*. I would argue that such a distinction might enable an approach where specific set of theoretical models would explain the development of the capabilities and a separate set of models would enable organizations to actively manage capabilities.

Developing capabilities is different from managing capabilities. In order to describe how capabilities are developed, one would need to describe the acquisition of knowledge and its categorization into tacit and explicit (Gherardi, 2001; Nicolini, et al., 2003; Nonaka & Konno, 1998); and how this knowledge acquisition occurs jointly through collective learning, a process that requires a structured praxis as well as a legitimate place and time in the organization for it to function (Räisänen & Gunnarson, 2007). In the dynamic capabilities literature, this focus on learning is represented by Zollo and Winter (2002) who argue that the principal method by which learning new capabilities occur is through experience accumulation, knowledge articulation, and knowledge codification. As for studying the management of capabilities, the theories of Teece et al. (1997) and Eisenhardt and Martin (2000) become more relevant

approaches as these authors have been primarily concerned with conceptualizing capabilities at an organizational level, particularly in relation to bringing about competitive advantage. This was the reason why I utilized the approach of Teece et al. (1997) to study PubClient in Paper III, i.e. because the case in question was studied at an organizational level.

However, the concept of dynamic capabilities, as conceived by Teece et al. (1997) which was later developed into a framework (Teece, 2007/2012) was not fully compatible with the case that I was studying. There were two important differences: the first being that PubClient was a public organization whereas Teece et al. (1997) developed their concept with the assumption that organizations would seek competitive advantage in a market setting. This is different in the public sphere where there are no direct competitors to compete with. In PubClient's case, when other client organizations began copying their ways of working, that was seen as a positive outcome rather than as a negative one. The lack of competitors can be addressed by reframing the issue into one where the organization pursues growth instead of competitive advantage (Winch & Leiringer, 2016); or where the objective becomes the pursuit of improved effectiveness (Zollo & Winter, 2002); or like in PubClient's case, regarding the "competitors" to be internal by having individual units compete against each other. The term competitiveness itself therefore needs some clarification and particularly in relation to how it is understood in construction. This is a point raised by Flanagan et al. (2007, p. 998) who argued that future research needs to focus on producing empirical studies on construction competitiveness; research that moves forward "from understanding competitiveness to improving it."

The second difference that made Teece et al.'s. (1997, 2012) conceptualization of dynamic capabilities incompatible with the case of PubClient was due to PubClient having a project-based structure. The dynamic capabilities concept as described by Teece et al. (1997) focuses on the permanent organization whereas construction clients function in both a temporal project organization where the projects are executed and a permanent organization that supersedes it. To bridge this gap, I used the framework of Davies and Brady (2016) who proposed a different conceptualization of the dynamics of project capabilities in which they argued that there is an ambidextrous dimension to project capabilities; deploying dynamic capabilities in project-based industries such as construction requires a level of balance between replication and renewal strategies. In Paper IV, their framework was used to examine a case of an association of client organizations in Sweden, and in the process of doing so, argued for a contextualization of the framework that also took into consideration the resources utilized by the client organization (Figure 9). Below follows a discussion on some statements that can be made about dynamic capabilities in the context of client organizations, based on the previous two studies (Paper III and IV).

5.1 Possible correlation between the rate at which an organization executes decisions and the development of its dynamic capabilities

Although the external environment had changed for the studied client organizations, between Paper III and IV respectively, in terms of a generational change (there is a rapid rise in the age demographics of the work force, rapid influx of new personnel, increased staff turnover, and an increased investment volume), their respective organizations had not changed at a rate equal to that of the external changes. The interviewees that I spoke to would frequently refer to how their respective organizations had been slow to respond to the changes that were occurring in the industry. The rate of change was often seen as a vital component as to why their organizations had not been able to adapt to the changing circumstances. I would therefore suggest the use of the term ‘dynamic capabilities lag’ to indicate the relationship between the rate of change in the external environment and dynamic capabilities:

Dynamic capabilities lag refers to the discrepancy between the dynamic capabilities needed to adapt to external changes and the rate at which an organisation undertakes decisions in response to those changes. Increasing the rate at which an organisation executes decisions is conducive to the efficacy of dynamic capabilities

Based on the studies conducted in Paper III and IV, I argue that there is a positive correlation between the efficacy of dynamic capabilities and *the rate* at which an organisation adapts its routines or project capabilities to external changes. Teece et al. (1997) argue that dynamic capabilities enable organisations to react to external influences by reconfiguring their organisational resources. In the framework of Teece et al., the organisation reacts by scanning, seizing and transforming new opportunities, and it is through these mechanisms that dynamic capabilities are generated. Based on the data gained from the 16 organizations studied in Paper IV, it would seem that organizations that are slow to adapt will fall behind those that are quicker to respond irrespective of the type of adaptation that occurred. The issue is not necessarily about taking the *optimal* course of action in adapting to the external changes but rather about taking *a* course of action in response to the changes. It may be more advantageous for an organisation to commit to a speedy decision than it is for that organisation to refrain from taking any action out of fear of taking an incorrect action. The hesitancy to act toward change is a reoccurring theme throughout the interview studies conducted in the appended papers. In Paper III, it was noted that PubClient had developed standardized methods for *scanning* the external environment for emerging opportunities, e.g. they had routines that enabled project team members to identify and suggest new evaluation criteria to upper management and they had also developed outreach programs with other client organizations to identify any new opportunities as well as having developed procedures for business intelligence. However, they were then slow at capitalizing (seizing) those identified opportunities.

Galbraith (1977) defined uncertainty as the difference between the level of information required to take a decision and the level of information currently available. As the project proceeds, that gap is minimized, and it becomes possible to make an informed decision. With dynamic

capabilities however, it is not necessarily about taking a decision to adapt based on having all the required information available. The objective, I would argue, would be to reduce the lag between the changes that can be observed (scanned) in the external environment and the adaptations that the organization undertakes in response to those changes. Although it is not possible to react in real-time to external changes, the more an organisation can reduce its reactionary time, the more indicative that is of that organisation's ability to re-position its dynamic capabilities. This argument is in line with the idea of dynamic capabilities not being able to produce sustained competitive advantage. From the perspective of dynamic capabilities theorists, competitive advantage is temporary – it can be gained, relinquished and regained cyclically. Losing it over time is then perceived as a natural phenomenon that can only be remedied through a continuous pursuit of identifying new opportunities to improve the organization's potential to create value (McGrath, 2013; Wójcik, 2015). Thus, dynamic capabilities relate to establishing changes on a short-term basis, and in doing so, the rate at which those changes occur becomes of paramount importance.

5.2 Severe external stimuli may be required for public construction clients to deploy dynamic capabilities

Based on the studies in Paper III and IV, it would seem that in industries where innovation and change occur slowly (e.g. public construction), dynamic capabilities have an impact when the external changes are so severe that the organisation reaches a critical point: adapt or perish. Examples of this includes PubClient (Paper III) and their reluctance to change up until a point at which regulatory requirements had changed (e.g. by making the law of public procurement mandatory and by introducing new regulations in the wake of corruption scandals) which in turn required PubClient to change their operating procedures. The manager of the procurement unit interviewed in Paper III stated:

One of the reasons for establishing the procurement unit [...] was because of the rather strong focus on the purchasing group [a work group for procurement, consisting of staff from five different municipal organizations engaged in construction], considering the bribing scandals at the time and all that.

The view that the corruption scandals had an effect on the development of PubClient was also evident from the internal documentation that I had analyzed. In internal memos published by the municipality, the corruption scandals are mentioned as a contributing factor leading to the call for a major restructuring of PubClient's processes and the development of a shared set of guidelines that would enable a more transparent way of working.

Similarly, in Paper IV, the interviewees gave accounts of how the changes in the public healthcare sector (e.g. the sudden increase in the demand for healthcare facilities due to an ageing building stock, rise in immigration and urbanization as well as new healthcare process requirements) had not been addressed by their organizations until only recently, even though these changes had been occurring over a period of time.

The interviewees in Paper IV were generally in agreement that the way of working (with respect to the construction process) in their respective counties was not adequate to keep up with the increased demand for construction as well as the requirements of more transparent and effective processes. This criticism of their current operating routines could also be found in the internal documentation produced by the association of construction clients studied in the case (through PTS Forum), highlighting the overwhelming opinion that current operating routines were not adequate to meet the increased demand. In an internal feasibility report by PTS Forum, it is stated:

The healthcare sector is currently facing major investments, the sum of the planned investments over a five-year period is approximately 86 billion SEK. To be able to meet these challenges, a process must be developed that can handle complex and changing (dynamic) business needs and at the same time implement coordinated knowledge from research (evidence) and best examples. Therefore, this project [i.e. developing the process mentioned previously] was initiated.

Similarly, in the feedback questionnaire from the first workshop, it was indicated that the majority of those asked either agreed or agreed strongly with the statement “our working methods need to be changed.”

The more radical the change in the external environment, the more pressure is placed on the organization to utilize dynamic capabilities to endure. The public client organizations that were studied (Paper III/IV) worked with the same procedures for decades and typically did not alter their organizational routines even when the external environment was slowly changing. Only when the external changes were severe (i.e. investment volume increased, generational change etc) did the organizations begin to adapt to the external changes. This may constitute a differentiating factor between organizations that utilize dynamic capabilities at a higher level and those that do not. It would seem that the former would not reach a critical point before adapting whereas the latter may only act when the external circumstances have changed so severely that the organizations' survival is at stake.

This was the case for the examined clients in Paper IV where changes had only been initiated once the external environment had changed so severely as to make it unfeasible to operate with existing routines. Likewise, for the studied case in Paper III, the impetus to change had risen from several changes in their external environment in the form of public outcry throughout the municipality where they operated. This was partly driven by external triggers in the shape of highly publicized corruption scandals, these constituted sufficiently strong incentives to rectify the situation. These external triggers were pushed by consistent media coverage that exposed corruption in many public client organizations which in turn put pressure on politicians to take action.

5.3 Capability development in light of resource allocation

A common theme among many public clients in OECD countries has been the tendency to emphasize the importance of public sector performance and getting the maximum amount of

‘value’ for the money that has been invested (Heinrich, 2012). This trend can be positioned in the wider context of NPM principles and a deregulation of public sector organizations. At the core of this argument lies the assertion that one cannot actively dismantle client organizations, thereby reducing their in-house capabilities, and at the same time expect those organization to perform better with fewer resources. Shifting the debate from one of resource allocation to one of capabilities does not serve to address the underlying issues with these organizations. Yes, there is a widespread view arguing that public organizations are underperforming in comparison to private ones (Boardman & Vining, 1989; De Waal, 2010; Khan & Reinhart, 1990); and yes, it would be beneficial for these organizations to be more accountable in terms of the value that they produce (Bouckaert & Halligan, 2008). However, this does not negate the need for these organizations to acquire the necessary resources needed to build the in-house capabilities that will allow them to deliver efficient projects. In Paper IV, I stress this point by discussing resource usage with regards to the framework of Davies and Brady (2016), in order to emphasize that the way that the client organization structures its organization should not only be informed by the level of volatility in the external environment, but also by the amount of resources it can deploy to bring about those intended changes to the organization. The issue of ‘developing capabilities’ simply cannot be divorced from the notion that one requires resources to do so.

5.4 Unpacking the ‘dynamic capabilities’ term

A growing body of research has begun to tackle the need for explicating, on a foundational level, how dynamic capabilities can be understood from the operational procedures/routines of organizations. Attempting to unpack the dynamic capabilities concept into its constituent parts has been likened to opening up a ‘black box’ (Dixon, et al., 2014). A key terminology used in these circumstances are that of microfoundations: the attempt to break down a macroeconomical model into smaller units (microfoundations) that can be more readily observed and evaluated. This notion has become increasingly influential in the literature as exemplified by Eisenhardt et al. (2010) and the pursuit of the “microfoundations of performance”; or Felin et al. (2012) who sought to map the “microfoundations of routines and capabilities”; or of a more particular relevance to this thesis: the “microfoundations of dynamic capabilities” (Gavetti, 2005; Hodgkinson & Healey, 2011; Teece, 2007). The premise behind Gavetti’s (2005) paper is that research on capabilities needs to be based on microfoundations that capture more completely what is known about cognition and action within organizations. This call to highlight cognition as the primary microfoundation behind dynamic capabilities has spurred a range of studies along a similar theme (e.g. Felin et al., 2012; Heimeriks et al., 2012; Laamanen & Wallin, 2009). From the outset, it would certainly seem that research on the microfoundations of dynamic capabilities will help produce more fruitful results, or at the very least, help to provide a model of dynamic capabilities that is more atomized and specific, and as an extension of that, enabling a much more developed discussion.

It is difficult to describe precisely what constitutes dynamic capabilities in a concrete way, the concept has more to do with looking at activities in an organization. It is not easy to grasp or alter the organization's dynamic capabilities as these seem embedded in the activities of the organization. This leads me to question how to proceed with the research described in this thesis. One possible way of continuing this line of research would be to simply refrain from using the term altogether. The difficulty with grasping 'dynamic capabilities' empirically might indicate that the term leads to a cul-de-sac. This may prompt one to abandon the concept entirely or to question whether there is any use in it at all, a sentiment perhaps best exemplified by Buell-Armstrong's (2015) recent doctoral thesis with the provocative title: "*Dynamic capabilities – The emperor's new clothes?*" As is evident from the papers discussed in this thesis, I refrain from discarding the concept entirely, although I do contend that dynamic capabilities as a concept needs to be contextualized to the specific context that is being studied. Otherwise it becomes an exercise in discussing organizational activities on a meta-level, a level where they exist but no one knows what or where they are.

If we regard dynamic capabilities as a theoretical lens through which organizations can be investigated, it would only make sense to apply this lens if it would provide us a means to see things more clearly as opposed to a lens that would further obscure matters. As it stands currently, there are various theories concerning how dynamic capabilities are developed and can be managed. These include theoretical contributions that enable the user to gain a better understanding of a specific organization's underlying capabilities in addition to other theoretical contributions that serve to complicate the concept further. Going forward, there seems to be two streams of research with regards to dynamic capabilities, one such stream seeks out to deconstruct the concept and reveal its inner parts in order to gain a more specific understanding of the concept (cf. Felin, et al., 2012; Helfat & Peteraf, 2015; Teece, 2007). The other stream of research seems to do the opposite by layering on additional levels of abstraction, thus making a complex concept *more* complex. It seems to me that the former route yields a more fruitful outcome, and it may be that the study of microfoundations gives rise to such a future, one in which applying dynamic capabilities clarifies the actions that are being studied, instead of the opposite.

6 Conclusions

In this thesis, I have explored the use of the dynamic capabilities' concept in the context of construction with a focus on construction client organizations. Specifically, I sought out to explore the way by which the concept of dynamic capabilities could aid in managing client capabilities in a way that addressed construction-related challenges. In Paper I and II, these challenges have consisted of cost and time overruns whereas Paper III and IV have examined challenges specific to the studied client organizations. A literature review was carried out to clarify the concept of dynamic capabilities (RQ1). I then explored how dynamic capabilities were conceptualized in a construction context (RQ2), with respect to specific cases of public construction clients in Sweden. This was then followed by a discussion of the broader implications of adopting the dynamic capabilities concept.

The contributions of this thesis relate to both the dynamic capabilities concept, as well as the public construction client. Listed below are some implications for practice and research that can be drawn from the appended papers. It is in no way suggested that these are universal to all similar client organizations in the construction industry. Instead, these statements are to be regarded as the results of four studies presented in this thesis that draw on the experiences and perceptions of client organizations in a Scandinavian context.

6.1 Implications for practice

Paper I indicated that current methods for assessing and dealing with cost overruns have been inadequate whereas Paper II sought to provide a foundation for future studies seeking to use the dynamic capabilities concept to deal with overruns, by establishing the limits of the dynamic capabilities concept as it relates to cost and time overruns. The case made for reevaluating current approaches for dealing with overruns are in line with the widespread call for change in the organization of the public sector (Pisano, 2015; Van Wart, 1996) as well as for the construction industry (Harty, et al., 2007; Mohamad, et al., 2014; Moore & Dainty, 2001). Going back to RQ2, the conclusions that were drawn from the studied cases demonstrated that the dynamic capabilities concept could be used to address client-related challenges. Conclusions that contain implications for practice include:

- The disparity between the ability to sense opportunities and seize upon identified opportunities. If client organizations develop routines for the former but not for the latter, this risk hindering the organizations' ability to undertake changes that are congruent with the changing environment. The study emphasizes the importance of urgency for client organizations to enact changes that they have identified as advantageous. [Paper III]
- Factors that caused overruns for the studied client organization related to those that can be attributed to project coordination and determining the project requirements/scope in the early phases of the project. Therefore, client organizations who seek to mitigate (the

quantifiable factors that cause) overruns may seek to reexamine their procedures for setting the scope of the project, and implement stage-gate processes that ensure that the project only receives additional funds above a certain threshold as long as the request for additional funds is reevaluated. The reevaluation should be based on the changed conditions in the project (i.e. does it still make sense to continue with the project?) and not on the initial basis upon which the decision was taken [Paper I/II]. By reevaluating the viability of a project based on its projected future outcome, clients could potentially avoid the sunk cost fallacy that leads to an ill-conceived project that repeatedly receives additional funds on the mere notion that the project has already received so much investments that one feels compelled to complete it.

- This thesis highlights the importance of analytics and gathering internal data for client organizations. The analytics conducted by PubClient's management was seen as a vital component in their ability to enact organizational changes. This is particularly important for client organizations in the present due to the increasing need to gather and assess large amounts of data. Having the ability to access and analyze 'big data' is reshaping the setting for construction economists, as well as providing new opportunities for research into construction technologies (Bilal et al. 2016; Bröchner, 2018). A suggestion for clients would hence be to develop practices for assessing and gathering data as this enables the organizations to understand any changes in their own users' behavior as well as that of the external environment. Having knowledge of the changes that are occurring is a key prerequisite for being able to alter the client organization's internal resource base in accordance with the external environment. [Paper II/III]
- The importance of governance capabilities, particularly with respect to developing and maintaining structured project coordination mechanisms when the external environment has become more volatile. [Paper III/IV]
- The conducted studies suggest that client organization should focus on maintaining organizational structures that can reconfigure depending on the volatility of the environment. The key contributor to an advantageous organizational outcome has not been individual 'capability' but rather structurally consolidated organizational units where resources are spent where most needed [Paper III/IV]. Likewise, a negative contributor to an advantageous organizational outcome for clients was the disconnect between project financiers and those who execute projects in terms of understanding the key challenges of the client organizations. A recommendation for client organizations would therefore be to bridge the gap between the knowledge possessed by those who operate in the project environment and the elected officials who fund their projects. [Paper IV]

With the public client, in most cases, constituting the primary owner and maintainer of built facilities, the public construction client is in a unique position to alter the trajectory of the construction industry. Doing so however, requires that the client does not regard the building

as end in itself but rather as means to achieve wider objectives during the building's lifecycle, taking into consideration the activities of the users of the building (Haugbølle & Boyd, 2016).

The impetus to change has been driven predominately by the resource constrained environment of local politics in which construction clients have been put under increasingly more stringent measures of scrutiny. Among the benefits of the increased levels of scrutiny are the numerous governmental reports that have been published (e.g. NAO, 2009; Productivity Committee, 2012) suggesting possible ways of improving the construction clients' performance. In doing so, the bulk of the arguments have centered around finding ways for optimizing current practices, whether that be by qualitative measures aimed at improving the clients' capabilities or through quantitative measures assessing the financial value for money that the clients provide. Paper IV suggests that this approach will meet limited success, and that significant changes in performance will come about primarily through significant changes in the structure of the client organizations and not by minor alterations of their current routines (cf. PTS, 2018). This runs contrary to the approach dictating that the construction client needs to be preoccupied with optimizing their current capabilities in such a way as to offset the negative effects of budget cuts and structurally disintegrated administrative functions (Adukpo & Leiringer, 2016). For instance, in the report issued by the Swedish Productivity Committee on behalf of the government, public clients are urged to work towards more "efficient resource usage and shorter construction times" (Productivity Committee, 2012, p. 32) without explicitly urging the financiers to increase the resources available to the client organizations. Although issues regarding optimization has a valid place in the larger discourse on public sector clients, these issues are secondary to those pertaining to the funding and structuring of said organizations. Thus, an overzealous approach to optimizing current capabilities risks overshadowing more pressing matters and may lead to a type of 'race to the bottom' in that these organizations pursue methods that produce nominal results whilst neglecting the larger issues surrounding finances and organization.

6.2 Implications for further research

The studies that have been conducted in the appended papers have all been performed in the Scandinavian region, specifically within Sweden. To extrapolate the results that relate *specifically to construction clients* and apply them outside of this region requires that a more comprehensive international study be undertaken, and even then, the specific context or culture may differ so greatly as to prohibit any meaningful replicability to occur. I would, however, contend that the contributions of this thesis still are largely applicable to cases outside of its specific geographical context but still bound by its sector specific context (i.e. public-sector organizations). Possible avenues for further research may include the development of models that can provide prescriptive guidance to practitioners in the industry, similar to how certain models that began as strategic management theories in the research literature, e.g. Shewhart's (1931) work on statistical control, which would later be adapted into the widely used Six Sigma system in the manufacturing industry (Best & Neuhauser, 2006). Research into dynamic

capabilities has yet to produce something of that nature, and it is my opinion that this needs to be the new frontier of this research, i.e. deconstructing dynamic capabilities to such an extent that it becomes possible to produce operational models that are actively used by organizations. Although there have been efforts to do this, e.g. Arena et al. (2013) who utilize the dynamic capabilities concept prescriptively in a risk management model. Nevertheless, these efforts have yet to produce results that can be reproduced. In a recently published article, Teece (2018) goes further and argues that mastering the dynamic capabilities framework is difficult precisely because it does not lend itself to basic checklists. This begets questions regarding the nature of dynamic capabilities and to which degree they can be incorporated into tangible models, without deviating too significantly from what the concept originally set out to address. In my previous discussion regarding the microfoundations of dynamic capabilities, I noted that this stream of research could potentially provide a conceptualization of dynamic capabilities that is more atomized and therefore less vague. This argument however requires that the identified microfoundations do not detract from what the dynamic capabilities concept was meant to address. Otherwise, by reexamining the dynamic capabilities concept and *limiting* its usage by *only* examining its constituent parts (in terms of microfoundations), one risks detaching the term from having an independent meaning from that of its constituent parts (i.e. the whole being greater than the sum of its parts). For instance, numerous dynamic capabilities theories have identified ‘cognition’ or ‘learning’ as microfoundations of dynamic capabilities, and thereby shifted the discussion to that of learning mechanisms, which have already been studied extensively in the literature. This raises the question: what benefit does adopting a dynamic capabilities approach bring to the discussion if that subsequently leads to a discussion of learning and cognition? Learning and cognition can ultimately be studied independent of the dynamic capabilities literature. This would mean that the dynamic capabilities concept enjoys scholarly curiosity not *in spite* of its vagueness but rather *because* of its vagueness. Attempts at increasing the preciseness by which we can understand the constituent parts of the term could lead us to familiar concepts that have been described elsewhere (such as in the knowledge and learning literature). I would argue that the current value in using the dynamic capabilities perspective is not necessarily in its prescriptive qualities but rather in its conceptualization as an overreaching concept that enable managers to rethink their strategic efforts by placing their internal resources (and capabilities) in relation to external forces. From this point of view, the dynamic capabilities concept, enable organizations to take into consideration the human capital and the inherent capabilities of its employees to induce meaningful change in the face of external pressures.

Likewise, the application of the dynamic capabilities frameworks that are presented in the appended papers represent theoretical models illustrating how dynamic capabilities relate to public construction clients. This represents a step forward in understanding how client organizations in construction develop dynamic capabilities. What is lacking however, and which future research might address, is the development of a formal theory which can provide prescriptive guidance that can explicitly deal with the challenges that construction clients face.

In order to establish a future research agenda that seeks to produce a dynamic capabilities model that can be used prescriptively, a number of contingencies need to be addressed. These contingencies relate to the contested issues regarding the transient nature of dynamic capabilities, and whether they can exist in a dormant state until they are required or if they only exist in action? (Ambrosini & Bowman, 2009). If dynamic capabilities only emerge ‘in action’, this would seem to imply that any model utilizing dynamic capabilities would be limited in terms of only being able to provide retrospective interpretations of past events without being able to provide any future guidance. Future research that seeks to examine dynamic capabilities ‘in action’ would have to employ a methodological approach that is suitable for that purpose, e.g. by conducting a longitudinal study where the researchers are both conducting and being active participants in the research (cf. Reason & Bradbury, 2001). Although the initial framework by Teece et al. (1997) did not set out to provide a model that could provide prescriptive guidance, a recent research paper by one of the co-authors of that paper has sought to develop a dynamic capabilities framework that can be used prescriptively (Pisano, 2017). The framework of Pisano (2017) seems to take a step in the right direction, although the framework in its current adaptation needs to be “further developed and tested empirically” (ibid. p.759) before it can be adopted in cases outside of that examined by Pisano.

Although it is certainly not clear what the future of the dynamic capabilities concept holds, what is clear in the present, is the need for the concept to outgrow its past delimitations of only being able to provide a retrospective interpretation of past events, and instead take on a prescriptive quality that enables the concept to inform future decisions that can guide organizations to more fruitful outcomes.

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Appendix I

Data collected from PubClient's internal project investment portfolio. Figures for cost overruns [%] are calculated as the quotient of the cost difference (at the time of reporting, 2019-01-28) and the budgeted cost.

<i>No.</i>	<i>Type</i>	<i>Date for feasibility study</i>	<i>Budget [SEK]</i>	<i>Cost prognosis [SEK]</i>	<i>Actual costs [SEK]</i>	<i>Cost difference [SEK]</i>	<i>Calculated Cost overrun [%]</i>
1	Special service home	2010-05-11	18500000	27481920	12200348	8981920	48,55%
2	Special service home	2011-08-30	16000000	27000000	2632906	11000000	68,75%
3	Elementary school	2011-09-27	166000000	214229265	154693575	48229265	29,05%
4	Elementary school	2012-03-15	270000000	270022663	3056900	22663	0,01%
5	Elementary school	2012-11-27	87120000	93468559	93468559	6348559	7,29%
6	Special service home	2013-01-30	16000000	28500000	3041819	12500000	78,13%
7	Preschool	2013-03-19	56000000	56533451	56333000	533451	0,95%
8	Elementary school	2013-04-10	77000000	92162876	92162876	15162876	19,69%
9	Preschool	2013-04-11	50000000	59483409	59752992	9483409	18,97%
10	Elementary school	2013-04-24	90000000	95407784	93938987	5407784	6,01%
11	Preschool	2013-05-31	38000000	38470920	38470920	470920	1,24%
12	Preschool	2013-06-20	40000000	60682900	57561638	20682900	51,71%
13	Preschool	2013-06-20	34000000	52955444	49957309	18955444	55,75%
14	Elementary school	2013-07-02	242000000	266697607	263199149	24697607	10,21%
15	Elementary school	2013-08-23	151750000	153594503	153594503	1844503	1,22%
16	Special service home	2013-11-25	18000000	26000000	2815995	8000000	44,44%
17	Elementary school	2013-12-11	19250000	37391802	5062712	18141802	94,24%
18	Elementary school	2013-12-12	150000000	196192469	185142676	46192469	30,79%
19	Elementary school	2014-01-15	8000000	14900783	14788783	6900783	86,26%
20	Elementary school	2014-03-11	96875000	104056800	108373993	7181800	7,41%
21	Elementary school	2014-03-11	11125000	30000000	41000	18875000	169,66%
22	Elementary school	2014-03-12	59000000	102086225	36757721	43086225	73,03%
23	Elementary school	2014-03-20	97000000	138000000	22806656	41000000	42,27%
24	Preschool	2014-03-26	41000000	44392486	43993321	3392486	8,27%
25	Secondary school	2014-05-28	8000000	12145173	12145173	4145173	51,81%
26	Special service home	2015-01-12	18000000	26615717	24056747	8615717	47,87%
27	Special service home	2015-02-18	18000000	30132132	21971316	12132132	67,40%
28	Preschool	2015-02-26	39000000	51158435	32350331	12158435	31,18%
29	Preschool	2015-04-14	55000000	67000000	36233858	12000000	21,82%
30	Elementary school	2015-05-27	154000000	174549294	39227294	20549294	13,34%
31	Preschool	2015-05-27	55500000	77844842	42500305	22344842	40,26%
32	Elementary school	2015-06-22	8200000	8766680	8766680	566680	6,91%
33	Preschool	2015-09-08	70000000	114490069	15628322	44490069	63,56%
34	Preschool	2015-09-11	42000000	53289999	29030082	11289999	26,88%
35	Special service home	2015-09-29	21000000	21850000	394161	850000	4,05%
36	Miscellaneous	2015-10-06	6426238	7330500	7330501	904262	14,07%

37	Special service home	2015-10-13	4956000	25442096	71335	20486096	413,36%
38	Elementary school	2015-10-26	12653937	13114155	1942156	460218	3,64%
39	Elementary school	2015-10-26	3500000	3641213	3641213	141213	4,03%
40	Preschool	2015-10-28	42000000	56936258	30039113	14936258	35,56%
41	Preschool	2015-10-28	35500000	60895702	3522672	25395702	71,54%
42	Miscellaneous	2015-11-17	2500000	2500384	509384	384	0,02%
43	Elementary school	2015-11-20	6000000	6333560	6333560	333560	5,56%
44	Preschool	2015-11-20	9000000	16658597	16665000	7658597	85,10%
45	Elementary school	2015-11-23	1700000	6100314	6100314	4400314	258,84%
46	Preschool	2015-12-09	59000000	69042775	6855395	10042775	17,02%
47	Elementary school	2015-12-16	5200000	5276862	5276862	76862	1,48%
48	Secondary school	2015-12-16	332000000	353548527	134417079	21548527	6,49%
49	Preschool	2015-12-22	37000000	44350000	44094497	7350000	19,86%
50	Elementary school	2016-02-23	27000000	56156860	8189009	29156860	107,99%
51	Special service home	2016-04-05	24000000	27200000	24648716	3200000	13,33%
52	Special service home	2016-04-05	21000000	25000000	22633993	4000000	19,05%
53	Preschool	2016-05-03	64000000	64025000	0	25000	0,04%
54	Elementary school	2016-05-03	270165000	272630391	835669	2465391	0,91%
55	Special service home	2016-05-13	30000000	40979544	4378473	10979544	36,60%
56	Secondary school	2016-05-16	19250000	19552506	311716	302506	1,57%
57	Elementary school	2016-05-31	260000000	287000000	31146690	27000000	10,38%
58	Preschool	2016-05-31	76500000	96471838	8320269	19971838	26,11%
59	Preschool	2016-06-13	26000000	36090432	4818214	10090432	38,81%
60	Elementary school	2016-09-06	250000000	300000000	29816602	50000000	20,00%
61	Preschool	2016-09-13	54000000	59400000	3401276	5400000	10,00%
62	Nursing home	2016-09-16	17200000	27200000	25811953	10000000	58,14%
63	Elementary school	2016-10-25	214000000	357083350	104360741	143083350	66,86%
64	Special service home	2016-11-29	28800000	29769032	595173	969032	3,36%
65	Nursing home	2017-01-17	68572333	100000000	4045255	31427667	45,83%
66	Elementary school	2017-02-06	139000000	157444689	100251961	18444689	13,27%
67	Special service home	2017-02-06	23000000	28092806	21830978	5092806	22,14%
68	Special service home	2017-02-21	26900000	28236620	685862	1336620	4,97%
69	Preschool	2017-02-21	55487000	59000000	178585	3513000	6,33%
70	Secondary school	2017-02-23	30500000	30580000	6597736	80000	0,26%
71	Elementary school	2017-06-28	6000000	8703228	6723228	2703228	45,05%
72	Elementary school	2017-06-28	10000000	20000000	18926062	10000000	100,00%
73	Preschool	2017-08-24	17885000	17935000	30819	50000	0,28%
74	Elementary school	2017-11-20	70000000	88478351	6265602	18478351	26,40%
75	Solar energy	2018-07-09	669808	699800	58695	29992	4,48%
76	Solar energy	2018-07-09	1185259	1685000	47770	499741	42,16%

Appendix II:

Workshop results

Summary:

Results workshop 1 – Challenges and tools:

LONG-TERM STRATEGIES AND PLANS need to be connected to projects (local, regional, national)

- Value strategic plan
- Property strategic plan

There needs to be better SUPPORT for describing needs/demand

- Long term assurance
- Generality

There needs to be better SUPPORT for the PROCESS PLANNING BODY through a structured work process:

- Resource planning (time/capabilities)
- Documentation
- Mandate / Decision making

There is a need for IMPROVED UNDERSTANDING in the projects

- Property function > Health service
- Operations > Project prerequisites and process
- Operations > relationship between operations development and changing local needs
- Decision makers > Consequences of choices and ambitions

Summary:

Results workshop 2 – Project definition:

What should be done/clarified before a project ends up at the property function?

REPRESENTATION:

- Process managers (Regions)
- Operations management
- Operations Development Officers
- Financial officers
- Property representative
- Advisers

CONTENT/EVALUATIONS:

- Which type of activities are associated with the project?
- What is the project's goal and purpose?
- How can the project be evaluated?
- What does (project) success mean?
- SWOT-analysis
- Financial constrains

- Which other decisions are relevant?

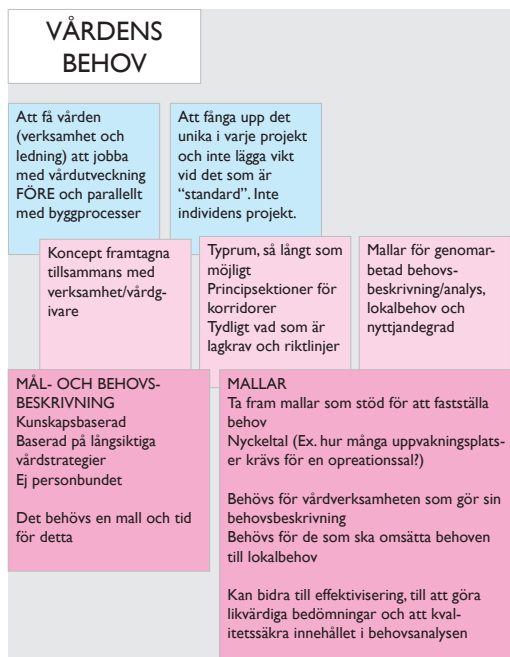
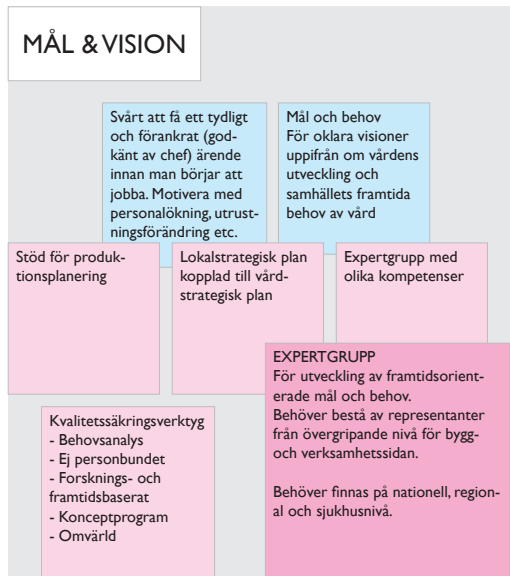
PLANNING

- Which resources does the next phase require?
- Which structure should the project have?
- How should the decision process look like?
- How should the participation process look like? (staff, patient representatives etc)
- Which questions must be answered in the next phase?
- How can research be involved?

DOCUMENTATION

- Basis for recommendation for political decision.
- The property function should pose stricter demands on the clarity and quality of the commissioning. For example, through a general template for commissioning orders with certain points mandatory and others electable.

Results workshop / Original Swedish document



DET BEHÖVS BÄTTRE STÖD FÖR BEHOVSBESKRIVNING

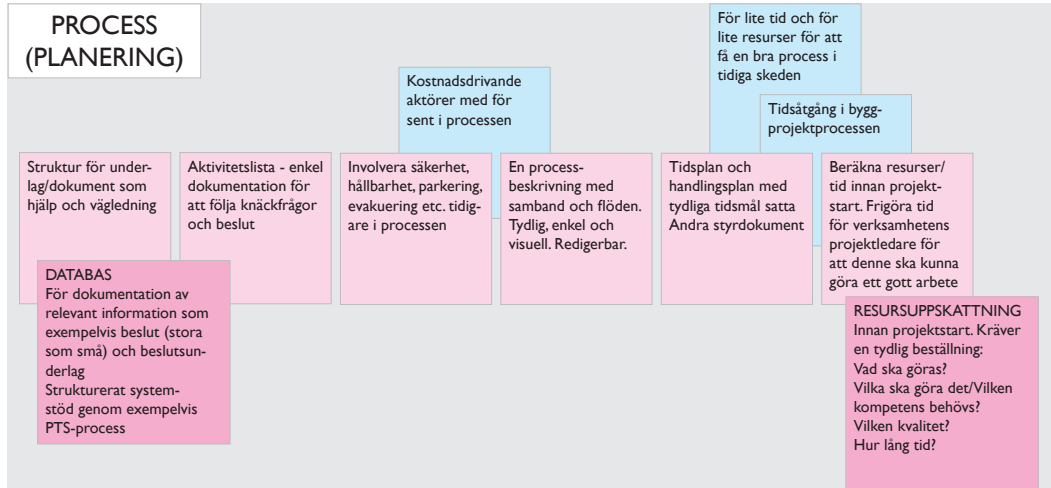
- Långsiktighet/Framtidssäkring
- Generalitet

DET BEHÖVS LÅNGSIKTIGA STRATEGIER OCH PLANER ATT KNYTA AN TILL I PROJEKT (lokala, regionala, nationella)

- Vårdstrategisk plan
- Fastighetsstrategisk plan

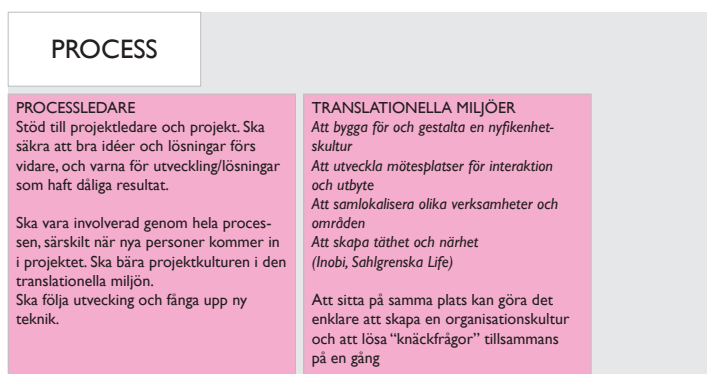


Results workshop / Original Swedish document



DET BEHÖVS BÄTTRE STÖD FÖR PROCESS-PLANERING GENOM EN STRUKTURERAD ARBETS-PROCESS:

- Resursplanering (tid och kompetens)
- Dokumentation
- Mandat/Beslutsordning

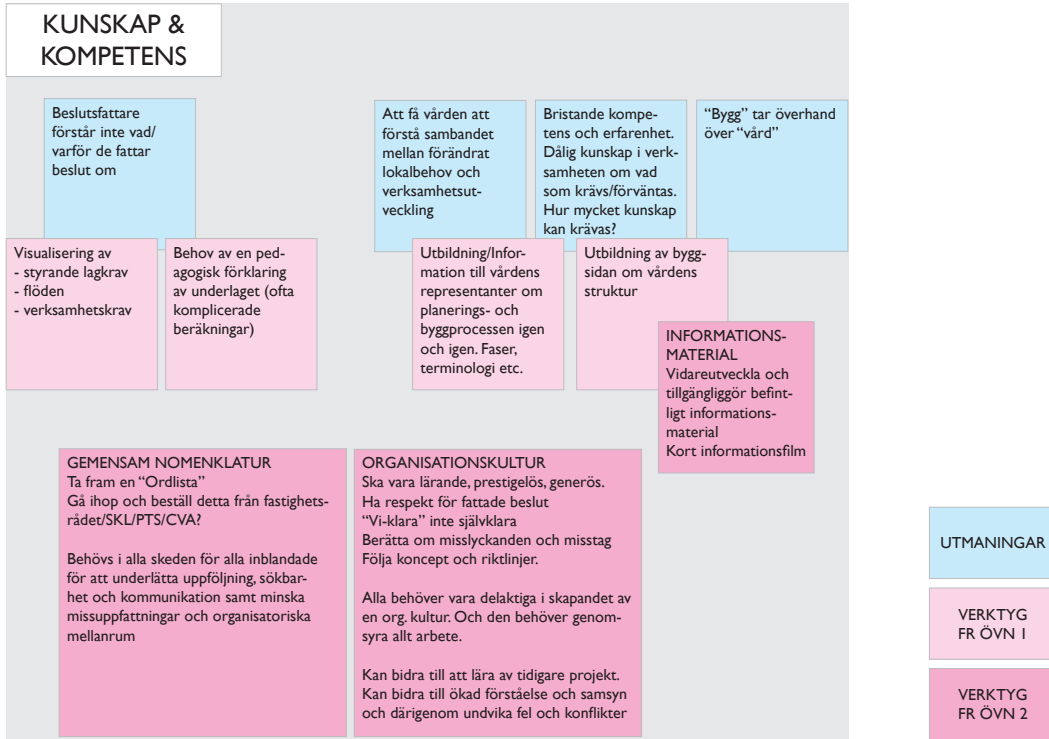


UTMANINGAR

VERKTYG
FR ÖVN 1

VERKTYG
FR ÖVN 2

Results Workshop / Original Swedish document



DET BEHÖVS ÖKAD FÖRSTÅELSE I PROJEKT

- Byggorganisationen > Vårdverksamheten
- Verksamheten > Projektförutsättningar och process
- Verksamheten > samband mellan verksamhetsutveckling och förändrade lokalbehov
- Beslutsfattare > Konsekvenser av val och ambitioner

