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How public bodies deal with technological uncertainty over time

An exploratory analysis through dynamic capabilities lenses

Claudia Zamarian

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How public bodies deal with technological uncertainty over time

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by

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Preface

I had the opportunity to spend my last year of Master of Science at the Norwegian School of Economics (NHH) in Norway as part of the Double Degree program. The inspiration for this thesis came from experiencing life in this country and particularly from an inspiring guest lecture conducted by an employee from the Norwegian Tax Administration.

I thank my supervisor, Christine B. Meyer, who supported me and the idea for this thesis from the beginning. Her insights and encouraging presence have helped me in reflecting critically and exploring different perspectives.

I thank the RaCE (Radical Technology-Driven Change in Established Firms) research centre at NHH university for the support throughout the writing process. The presentation sessions with professors and other master students provided precious feedback. Sharing the process of writing the thesis with other students and competent professors made it exciting and reassuring. It was comforting knowing always to have someone ready to help.

I thank the informants who participated in this study for their availability and sincere interest shown in this research. Without them, this thesis would not exist.

Lastly, I sincerely thank my family, my boyfriend, and my closest friends. Even at more than two thousand kilometres away, they have given me the strength to face the challenges and to follow my instincts. Their support and love in this peculiar period have been more critical than ever.

Bergen, June 2021

Claudia Zamarian

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1. Introduction

It is commonly argued that the discussion around uncertainty is particularly suited for the private sector, for example, when considering the level of competition, the pressure of consumers' demands, and the access to resources. However, both the private and the public context have to face high uncertainty when it comes to technology. Governmental bodies must keep up with speed to address the public's needs. Therefore, they need to update their systems and evolve. Moreover, one can argue that the impact that technological uncertainty has on the public context can be even more critical when compared to the "steadiness" that commonly characterizes this sector.

Organizations typically face such uncertainties deploying dynamic capabilities, which enable them to adapt to change (Teece *et al.*, 1997; Schoemaker *et al.*, 2018). The ability of an organization to sense the environment, seizing opportunities, and transforming accordingly is becoming necessary for all the actors to deal with complex and volatile contexts. Path dependency plays a crucial role in the evolution and development of organizations and related dynamic capabilities (Ambrosini *et al.*, 2009), sometimes representing an obstacle to innovation and some others a strategic and effective tool for survival.

It is often the private sector that you have in mind when discussing uncertainty. However, when it comes to technological uncertainty, also the public sector is severely hit. That is why this thesis aims at contributing to the discussion on dynamic capabilities in the public context, paying particular attention to how such capabilities develop over time.

This study consists of a qualitative research based on a case study, aiming at informing the following research questions:

How do public firms develop dynamic capabilities over time in situations with high technological uncertainty?

What are the factors inhibiting and facilitating the development of these capabilities over time?

Specifically, this research wants to investigate how sensing, seizing, and transforming capabilities change and evolve over time in a context of technological uncertainty. It aims to

contribute to further developing the theory and providing concrete evidence of the relevance of dynamic capabilities in the public sector, with particular reference to tax administration agencies.

2. Literature review

This section presents an overview of the literature necessary to frame the context of the study. It starts with a presentation of the technological waves and related technology uncertainty. Then, introducing the concept of dynamic capabilities as tools to deal with such unpredictability and eventually narrowing the discussion to the public context.

2.1 The technological wave and technological uncertainty

Technological development is a crucial element for the evolution of society. Here can be introduced the theory on "long waves", also called "economic waves of technological revolutions", initiated by authors like Schumpeter and Kondratiev and subsequently supported by others (see, for example, Smihula, 2009; Mansfield, 1983). According to those authors, technological development happens with specific patterns of evolution and decline. Throughout history, society experiences industrial revolutions that shaped the characteristics of the community. Starting from the finance and agriculture revolution in the 17th-18th century, moving to the industrial revolution of the following century, until the revolution of chemistry and machinery at the beginning of 1990s, then followed by the scientific and technical revolution started in the years of the Second World War. Focusing on the most recent decades, from the 1980s, we can spot the beginning of the information and telecommunication technology revolution, also known as the third industrial revolution, with the Internet and personal computer as protagonists. According to Schwab (2016), our society is currently experiencing the fourth industrial revolution characterized by an exponential pace, a systematic impact on society, and digitization as a driving force. This thesis concentrates on the two latest waves.

Starting from the 1980s, we have experienced severe shifts in technology, particularly with the advent of the Internet, that affected organizations, people, and societies as a whole. In forty years, an incredibly high amount of small and incremental innovations and higher-scale disruptive changes (Bower & Christensen, 1996) on the technological frontier have shaped the society we know today. Although these changes are now perceived as positive and necessary to evolve, they did not happen without costs. For instance, at the beginning of the

1980s, the advent of the Internet resulted in businesses becoming dependent on technological systems, which brought together new types of uncertainties and vulnerabilities (Naughton, 2016). From the 1980s until today, technological shifts have introduced new ways of performing operations and new ways of conceiving business. The advent of the Internet led to the computerization of the economy and made businesses dependent on new systems. This "information and communication technology" wave is related to globalization and digitalization, phenomena that strongly affected the functioning of society and the operations of businesses. Improvements in IT have enormously accelerated the pace of technological changes and the scope that such changes address.

The latest digital revolution – i.e., the fourth revolution (Schwab, 2016) - is identified with artificial intelligence, machine learning, and the Internet of Things (Schwab, 2016). Today's technology "is not simply about automating processes, but opening routes to new ways of doing business" (Fitzgerald *et al.*, 2014, p.2). The evolution that we are experiencing is not only on mere products and systems; rather, it entails a more profound and systemic shift: changing the "what is" to change the "who we are". Changes within the technological scenario bring a consequential and forced reconfiguration of how businesses think and operate. For example, the introduction and development of Artificial Intelligence and Machine Learning systems have stressed the importance of data, predictive tools, and information sharing, thus evolving the concept of competitive advantage and approaches to strategy (Iansiti and Lakhani, 2020; Hagiu and Wright, 2020). According to Holbeche (2018, p.304), "digitisation is transforming the business landscape at an exponential rate, shrinking the planning horizon, facilitating the rise of the virtual world, opening up new markets, increasing the range and nature of products and competition, as well as the expectations of customers for personalised products and services at low prices".

The term "waves" well describes these revolutions because it permits us to visualize a continuous development in which the subsequent revolution is somehow related to the previous one and so on. Along with evolution and development, a high level of uncertainty and unpredictability is brought by these shifts in the technological landscape. These revolutions entail rapid and sometimes radical changes that businesses and organizations must be able to address. Hence, the capability to adapt and innovate is becoming more and more relevant for economic actors to ensure long-term stability. Moving along these "long

waves", businesses are required to develop new competencies and at the same time destroy the obsolete ones. Milliken (1987) argues that an organization's environment is highly unpredictable, thus resulting in "environmental uncertainty". As stated by Tushman and Anderson (1986, p.439), "these breakthroughs, or technological discontinuities, significantly increase environmental uncertainty". Technological improvements are necessary for ensuring survival and development and simultaneously bring a high degree of uncertainty (Rosenberg, 1998), and dealing with such uncertainty must be at the top of leaders' agenda (Thompson, 2003).

When it comes to technological changes, the uncertainty is not only on the technical side but also on the related changes in processes and structures. For example, introducing a new system entails uncertainty regarding its relative effectiveness, its effects on the way of working, the structure, and communication flows. Moreover, the discussion becomes more complicated when considering society as a whole and the impacts on consumers, the environment, and all the other stakeholders. Technological innovations, both disruptive and incremental, run over society as a whole, thus changing habits and ways of thinking commonly established up until then. Some authors defined the "perceived technological uncertainty" as the individual's perception of inability to predict or understand some aspects of the technological environment (Downey *et al.*, 1975; Milliken, 1987). We can extend this definition to businesses that try to develop competencies and evolve to take out opportunities from that uncertainty.

Furthermore, focusing on the economic and business context, technological development is significantly broad because it not only entails changes in the technical systems. Instead, it often leads to structural reorganization and process reconfiguration. For example, the Internet enlarged the possibility of communication and interaction among systems, businesses, and people, and this has been further strengthened with the latest technologies that allow real-time responses.

2.2 How organizations deal with uncertainty: introducing dynamic capabilities

The uncertainty that organizations must address – technological uncertainty included - is particularly relevant in the current society, which is characterized by extremely high pace and rapid changes; the so-called VUCA world in which volatility, uncertainty, complexity, and ambiguity reign (Schoemaker *et al.*, 2018). How do businesses deal with such uncertainty? It is a question that several authors have addressed and answered with the necessity for companies to develop dynamic capabilities (Schoemaker *et al.*, 2018; Teece *et al.*, 1997; Teece *et al.*, 2016; Eisenhardt and Martin, 2000; Zollo and Winter, 2002; Zahra *et al.*, 2006; and others). These capabilities allow organizations to "integrate, build, and reconfigure internal and external competencies to address rapidly changing markets" (Teece *et al.*, 1997, p.516). In a world of uncertainties and rapid changes, dynamic capabilities "serve as a bridge between the present and the future" (Schoemaker *et al.*, 2018, p.18). While ordinary capabilities address the day-to-day operations of a business in stable conditions, dynamic capabilities are framed towards handling uncertainties and achieving more remarkable performance in a VUCA world (Schoemaker *et al.*, 2018). The ability of an organization to sense the changes, seize the opportunities, and transform accordingly is becoming essential. Dynamic and ordinary capabilities must not be considered as opposed but rather as interrelated with one another. Indeed, ordinary capabilities refer to specific business lines, whereas dynamic capabilities embrace the whole organization and orchestrate the ordinary capabilities by reconfiguring them (Schoemaker *et al.*, 2018).

The literature about dynamic capabilities started to become denser from the 1990s. However, it has been criticized by many scholars for its vagueness (see Arend & Bromiley, 2009; Barreto, 2010; Zahra *et al.*, 2006). As confirmed by the research carried out by Di Stefano *et al.* (2010) and supported by others (see Peteraf *et al.*, 2013), the literature on dynamic capabilities is far from converging towards a unique definition and conceptualization. The research mentioned above shows that most of the studies focus on internal processes for creating and deploying dynamic capabilities (see Zollo and Winter, 2002; Zahra and George, 2002; Makadok, 2001), while fewer papers consider other aspects such as alliances or individuals (see Helfat *et al.*, 2007). Moreover, other differences can be found in assumptions, reasoning, and conclusions (Peteraf *et al.*, 2013). The table below (Table 1)

provides a representative overview of definitions of dynamic capabilities given by different authors.

Author	**Definition of Dynamic Capabilities**
Teece et al., 1997	"*The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing markets*" p.516
Schoemaker et al., 2018	"*Higher order capabilities such as sensing change, seizing opportunities, and transforming organizations*." P.16 "C*apabilities that enable firms to identify profitable configurations of competencies and assets, assemble and orchestrate them, and then exploit them with an innovative and agile organization*." p.17
Teece et al., 2016	*"Dynamic capabilities ... defines the firm's capacity to innovate, adapt to change, and create change that is favourable to customers and unfavourable to competitors. Dynamic capabilities can be thought of as falling into three primary clusters: identification, development, co-development, and assessment of technological opportunities (and threats) in relationship to customer needs (the "sensing" of unknown futures); mobilization of resources to address needs and opportunities and capture value from doing so ("seizing"); and continued renewal ("transforming" or "shifting")."* p.18
Eisenhardt and Martin, 2000	"*The firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match or even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resources configurations as markets emerge, collide, split, evolve and die*" p.1107
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*" p.340.
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*" p.918
Wang and Ahmed, 2007	"*A firm's behavioural orientation constantly 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*" p.35
Helfat et al., 2007	"*The capacity of an organization to purposefully create, extend or modify its resource base*" p.1

Table 1: Overview of definitions of dynamic capabilities

Among such a vast and varied portfolio of definitions, this paper will consider mainly the perspective taken by Teece *et al.* (1997), Teece *et al.* (2016), and Schoemaker *et al.* (2018) because they outdistance themselves from basing dynamic capabilities solely on routines and competences; instead, they also stress the importance of the role of individuals, particularly managers. Moreover, these papers provide an analytical decomposition of sensing, seizing,

and transforming concepts that will help structure the analysis of the data collected. However, the perspective taken by Helfat *et al.* (2007) is also relevant for this study, which defines dynamic capabilities as the ability of an organization to "create, extend or modify the source base". The concept of resources is adopted in a broad sense (Barney, 1991), including processes, activities, competencies, and alike.

To provide a better understanding of the topic, two paragraphs are introduced below: the first consists of a presentation of the three concepts of sensing, seizing, and transforming; the second focuses on the time issue by bringing in the topics of path dependency and "history matters". Since the literature about dynamic capabilities is exceptionally vast, it is advisable to narrow it down to what is relevant and necessary for carrying out this study.

2.2.1 Sensing, seizing and transforming

Dynamic capabilities are often identified with sensing, seizing, and transforming. Sensing consists of detecting signals of changes; seizing addresses the need to innovate to rapidly take advantage of such changes; transforming entails organizational renewal abilities (Teece *et al.*, 2016; Schoemaker *et al.*, 2018; Baskarada & Koronios, 2018). These three clusters allow us to see the dynamic capabilities from a time perspective. Organizations need first to sense the environment and detect signals and then address such signals by performing and organizing appropriately. However, one must not only consider the time-relationship as linear and consequential, but it is more realistic to see the three concepts as interrelated. To better understand the sensing, seizing, and transforming clusters, the following subsections present them more in-depth. Additionally, the table below (Table 2) summarizes the specifications and tools of each ability.

Sensing

Detecting weak signals is the first action to handle uncertainties. Therefore organizations must possess a solid peripheral view (Schoemaker *et al.*, 2018). Signals of change come often from the external environment: technological innovations, government measures, socio-political trends. However, the look cannot be only addressed toward what happens outside the company's walls, but attention needs to be also paid to the inside (for example, signals of attrition). *Sensing* is operationalized using tools like scenario planning, real

options, and open innovation (Schoemaker *et al.*, 2018; Teece *et al.*, 2016). Scenario planning allows exploring the combined impacts of uncertainties and helps managers compare alternative situations (Ramirez *et al.*, 2015). Real options methodology allows organizations to carefully tackle uncertainties by adopting a decision-making process that consists of deferring an investment or making small investments (Ipsmiller *et al.*, 2019). It is a prudent method according to which the organization could rapidly change its commitment, "grow, wait or scale down", after assessing the ongoing investment process (Copeland and Keenan, 1998). However, within the scope of *sensing*, real options must be considered as "scouting options" that allow to "discover opportunities to break through barriers" (McGrath & MacMillan, 2000, p.159). They consist of "investments made with the intention of discovering and/or creating markets for products and services by deploying capabilities that you have (perhaps recently) developed in potential new arenas" (McGrath & MacMillan, 2000, p.160). The implementation of open-innovation, lead-user innovation mechanisms (see Chesbrough *et al.*, 2006; Morrison *et al.*, 2000), and similar tools that open up to collaboration and learning help organizations detect signals that they would not have perceived by themselves. Fostering cooperation and developing strategic alliances can result in superior knowledge and increased sensing ability (Schoemaker *et al.*, 2018; Helfat *et al.*, 2007). People working in the organization, particularly those at top levels, play an essential role in dynamic capabilities. Hence, individuals can anticipate changes and challenge the status quo, thus representing a vital tool for sensing (Schoemaker *et al.*, 2018; Teece *et al.*, 2016).

Seizing

Seizing is about implementing actions to take advantage of the external changes detected (Teece *et al.*, 2016; Schoemaker *et al.*, 2018). This requires the organization a more substantial effort and to respond promptly. *Seizing* an opportunity entails the mobilization of new resources and the implementation of new systems. Some authors (see Teece *et al.*, 2016; Schoemaker *et al.*, 2018) have defined elements that contribute to developing such capability. However, real options also appear in this second cluster with some differences compared to the real options for sensing. In this case, they better fit with the positioning and stepping-stone types defined by McGrath & MacMillan (2000). Positioning real options consists of the "right of organizations to wait and see" (McGrath & MacMillan, 2000,

p.159). Purchasing positioning real options enables the organization to initially adopt a position in the market that can be later changed in case of occurrence of uncertain events. On the other hand, stepping-stone real options are "stage attempts to sequentially discover new competencies to pursue highly promising but very uncertain potential markets (p.160). The sequential nature of this type of tool allows the organization to "fail quickly and learn fast". Indeed, crucial aspects for developing an incisive seizing ability are embracing and tolerating failures, experimentation, and learning (Teece *et al.*, 2016). Open innovation mechanisms and "flexible sourcing arrangements" represent (Teece *et al.*, 2016) ways to concretely address changes by giving the organization the possibility to take advantage of other actors' knowledge and competencies (customers, spin-off companies, other organizations, ...). Furthermore, due to the necessity of performing investments with unknown outcomes, having excess resources and capacity would work as buffers, thus representing a crucial tool for seizing. Considering the human factor, leaders with marked interpretative and decision traits may help the organization go further, not stopping at the evaluative stage of *sensing* but daring to tackle potential opportunities concretely.

Transforming

When the seized opportunities show the necessity for changes, the organization must transform accordingly. To favourably exploit the shifts detected, companies need to update their processes and systems, which often results in a more profound reorganization. Transforming capability consists of periodic organization renewal and continuous alignment and realignment (Schoemaker *et al.*, 2018). Adopting an agile and lean startup approach, which argues the importance of experimenting, failing, and learning particularly fits the context of high uncertainty. The vast literature on agile and lean approaches stresses the ability of organizations to reconfigure processes, people, and systems iteratively, thus providing appropriate responses to changes (see Yusuf, Sarhadi & Gunasekaran, 1999; Shari & Zhang, 1999). Having a top management that embraces learning and supports continuous realignment nurtures the *transforming* capability of the organization (Schoemaker *et al.*, 2018).

DYNAMIC CAPABILITIES	Specifications	Tools	References
SENSING	External scanning and Signals identifying (external focus) Knowledge dissemination enabling (internal focus)	Scenario planning	Schoemaker et al., 2018; Teece et al., 2016
		Open innovation, lead-user innovation	Schoemaker et al., 2018
		Develop strategic alliances	Schoemaker et al., 2018
		Enable rapid dissemination of knowledge laterally and vertically	Schoemaker et al., 2018
		Leadership traits: anticipate and challenge	Schoemaker et al., 2018
		Detect internal signals of wilful blindness	Schoemaker et al., 2018
		Real option plays to assess opportunities	Schoemaker et al., 2018; Teece et al., 2016
SEIZING	Mobilization of resources Implementation of new systems	Exploratory investments: Real options approach	Schoemaker et al., 2018;
		Open innovation process adoption	Teece et al., 2016
		Resources: Building internal slack and flexible sourcing arrangements	Teece et al., 2016
		Reengineering rule-bound hierarchies: tolerance for failure, learning, experimentation	Teece et al., 2016
		Leadership traits: interpret, decide	Schoemaker et al., 2018
TRANSFORMING	Organizational renewal Continuous alignment and realignment	"Build-measure-learn" methodology, MVP, lean startup approach, agile approach	Teece et al., 2016
		Leadership traits: align, learn	Schoemaker et al., 2018

Table 2: Sensing, seizing and transforming specifications

2.2.2 Time: Path dependency and "history matters"

Although the concept of time is naturally embedded when considering the topic of dynamic capabilities and related organizational agility, the primary argument highlighted is that "dynamic capabilities cannot be built overnight". Nevertheless, the time aspect is highly relevant and needs to be more carefully addressed. What an organization does is strongly dependent on what it did and how it did it before. Moreover, the development of dynamic capabilities is an iterative process that requires the organization a continuous attention

towards external changes and potential opportunities. Hence a consequent "refresh" of such capabilities is needed (Ambrosini *et al.*, 2009).

The development of dynamic capabilities is a matter of internal buildout; they cannot be bought from the external market (Teece *et al.*, 1997; Makadok, 2001). This intrinsic nature implicates that the organization's characteristics – in terms of culture, competencies, processes, activities – strongly affect the development of such 'superior' capabilities. Therefore, as stated by several authors, dynamic capabilities are path-dependent (Teece *et al.*, 1997; Zollo & Winter, 2002). An organization's ability to address the uncertainty of the external environment at a specific point in time depends on its current configuration of resources, processes, and activities. However, such configuration is the result of past decisions and a set of actions. In a few words, "history matters" (see Page, 2006; Schreyögg *et al.*, 2011). The past inevitably influences the present, and often it is hard for organizations to detach completely from the conventional way of doing. This is particularly true for big established companies that find it more challenging to modify themselves than more agile startups (Holbeche, 2018).

Nevertheless, "path dependency" can be a helpful tool for the organization when it entails proven successful practices and a good legacy. When it is related to positive developments, it is better called "path creation" (Garud, Kumaraswamy, and Karnøe, 2010). Dynamic capabilities must evolve through learning (Zollo & Winter, 2002), and the learning process cannot be detached from the "history" and "time" aspects. Established organizations might be more sensitive and scared of changes. Therefore, they tend to initially employ careful paths that do not require them to distance too much from the status quo. For example, the adoption of real options strategies suggests the organization to handle uncertainties "one step at a time" (McGrath and MacMillan, 2000; Ipsmiller *et al.*, 2019). It is easy to see how the position held by an organization at one point in time strongly affects its future state, and this argument is highly relevant in the context of dynamic capabilities. This study wants to investigate how the dynamic capabilities, in terms of sensing, seizing, and transforming develop over time; therefore, it is crucial to understand history, path dependency, and legacies. Indeed, according to Ambrosini and Bowman (2009, p.40), "'history matters' for dynamic capabilities and has a critical influence".

2.3 Dynamic capabilities in the public context

Until now, the literature review presents the topic without distinctions between public and private sectors, yet this thesis aims to investigate the development of dynamic capabilities within the public context. The theory about dynamic capabilities is often developed concerning the private sector. Nevertheless, the public context is also severely hit by the wave of technological uncertainty, thus requiring its actors to develop the ability to address rapidly changing environments. The differences between public and private sectors certainly require a specific discussion which this section provides.

As stated by Bryson *et al.* (2007, p.702), "Public organizations are externally justified […], their legal existence depends on serving public purposes". Therefore, as opposed to the private sector, public actors pursue social goals that are likely to balance and meet the expectations of several stakeholders and achieve public value, defined as the "value which is consumed by the public collectively" (Moore, 1995). One of the main tasks reserved for the public sector is the production and administration of public goods, characterized by non-rivalry and non-exclusivity (Bockstael & McConnel, 1993). As opposed to what the Resource-Based view theory affirms (Barney, 1991), which several authors base the dynamic capability topic on (Ambrosini and Bowman, 2009; Helfat *et al.*, 2007; Teece, 2007) when considering the public sector, rarity and inimitability are not characteristics that contribute to the creation of competitive advantage; quite the opposite, resources are valuable when are aimed at fulfilling the mission, not beating the competition. Indeed, in the public sector, cooperation overcomes competition: cooperation, rather than competition, among public actors and also among public and private actors, is the mechanism that would ensure the delivery of the public value (Rashman *et al.*, 2009). As Piening (2013, p.217) stated, public actors operate with respect to "political, rather than market forces".

Furthermore, when considering the "ownership" aspect, the public sector entails complex relationships. "Public organizations are collectively owned by members of political communities" (Piening, 2013, p.217). Hence, while the private businesses can be analysed by considering a relatively simple principle-agent relationship, the public sector is based on a much more complex and interrelated network of relationships in which different actors - the parliament, the ministries, the civil servants and politicians, and users/voters/citizens –, often

with different needs, connect with and influence each other (Johnson & Scholes, 2001). These aspects shape relevantly the performance of public organizations and, consequently, their capabilities and competencies. As stated by Rashman *et al.* (2009, p.484), "public organizations are often concerned with the production of intangible, relational services and outcomes, and are dependent on trusted, collaborative relationships". Indeed, the interchange, of formal or informal nature, among public organizations, among public and private organizations, and individuals or groups and organizations play a crucial role in innovation.

In the last decades, the theory on dynamic capabilities has been further expanded towards considerations of the public sector (see Piening, 2013; Pablo *et al.*, 2007; Daniel and Wilson, 2003). However, these papers may adopt a different definition of dynamic capabilities than the prevailing one – based on Teece *et al.*, 1997 – which represents the perspective of this thesis. Therefore, we can take some learnings from them, but with duly objectivity. For example, Piening (2013) specifies how routines represent the foundation of dynamic capabilities, having as a reference point the definition of dynamic capabilities formulated by Zollo and Winter (2002). However, the reader must not reduce the dynamic capabilities as mere routines; quite the opposite, they consist of a complex bundle of interrelated routines and, often, require complex processes and superior knowledge (Dosi *et al.*, 2008). Piening (2013, p.218) states the importance for public organizations to have dynamic capabilities such as "reshaping capabilities, knowledge-sharing capabilities, and managerial capabilities".

Public actors find themselves in a rapidly changing environment when it comes to technology, and several authors stressed the relevance of entrepreneurial experiments and incremental changes in such context (Daniel & Wilson, 2003). Moreover, changes in the public sector are often path-dependent and incremental (Piening 2013); therefore, when discussing dynamic capabilities among public actors, it is necessary to stress the "time aspect". Regarding this aspect, the public sector is more frequently called to innovate from external triggers rather than internal push (Piening, 2013). This is undoubtedly related to the resource allocation system, which generally does not provide a high level of slacks. Furthermore, uncertain contexts, such as during a crisis, might encourage innovation and more radical changes thanks to a stronger pro-activity by managers (Piening, 2013).

3. Research setting

This section aims at giving the reader a better understanding of the context in which the organization operates. It starts by introducing the tax administration sector and discussing how digitization affects it. Then, it provides information regarding the case organization for this study.

3.1 Narrowing the public context: the tax agency

Within the broad area of the public sector, this paper will specifically focus on the Tax Administration apparatus. Therefore, after having presented an overview of the public sector and its characteristics – to which undoubtedly also to the Tax Administration refers to – some additional concepts will be provided with specific reference to the interested public body. The administration of taxes is a key function in all societies, and it is usually entrusted to a public apparatus, the Tax Administration body. A key aspect related to what is already presented about the features of the public actors is that it operates under the authority of the Ministry of Finance. To put it simply, the role of the Tax Administration is to collect money from taxpayers to secure the financing of public services. Several are the challenges that they encounter, one among all is tax compliance and digitalization came in helping to tackle this problem, in fact, as stated in the OECD report of 2018 and reported by the International Chamber of Commerce, "digitalisation has already had a threefold positive impact on tax administration: enhancing the effectiveness of tax compliance, improving taxpayer services and reducing tax compliance burdens" (ICC BRITACOM, 2020, p.8). The tax function is extremely relevant in a society because it "plays a critical role not only in shaping economic development but in developing an effective state" (Bird, 1992, p.23). In his paper, Crivelli (2019, p.426) cites two characteristics that make a tax administration efficient: "[a modern tax administration needs] to be able to accurately identify compliance risks, and to effectively allocate limited resources and actions to address them". Additionally, as stated by the International Chamber of Commerce report, published in 2020, "a key feature of a good tax administration is a sound information system" (2020, p.1).

The digital wave has hit the public sector; hence Tax Administrations must adapt to new processes and instruments, as well as to a totally new way of thinking taxation. Moreover, the current society, which is increasingly more complex and uncertain (see, for example, the outbreak of the COVID-19 pandemic), requires adaptation to all the actors that operate within it, tax administrations included. In fact, according to the latest OECD report on Tax Administration (OECD, 2020, p.3), a new model of taxation is arising, termed Tax Administration 3.0, in which "tax administration processes are increasingly built into the natural systems used by taxpayers in their daily lives and businesses". Changing in the way taxation is perceived and consequently treated will become increasingly necessary for the societies, and Tax administrations are therefore called into question. To provide an efficient and effective performance coherent with the context in which they operate, modern tax administrations have to be agile and adaptive. Therefore they need to develop dynamic capabilities as well.

Digital transformation in tax authorities

Several independent actors, especially consulting firms, have published reports that investigate the phenomenon of digital transformation in tax agencies. The interest shown by big consultancy actors such as Deloitte, Ernst & Young (EY), PricewaterhouseCoopers (PwC) reflects the relevance and the great impact of this topic on societies. Tax administrations are working on transforming their processes into becoming more digital and handling the massive amount of data collected as a source of value rather than a mere product of the compliance process (Deloitte, 2019). The enormous amount of data makes the taxation authorities keener to adopt advanced analytics systems: Artificial Intelligence (AI) and Machine Learning (ML) are increasingly playing a critical role. The implementation of these systems is relevant in several operations of the Tax Administration: in the execution of projects, thanks to a more precise definition of the problem and the selection of relevant data; in predicting and forecasting; in the research for mistakes, irregularities, and omissions; in optimizing processes (Milner and Berg, 2017). Although the employment of such systems finds an obstacle in the privacy of data that are not publicly available, the use of "simulated data may enable AI model-building and can provide an alternative when tax data access is restricted" (Milner and Berg, 2017, p.9). Tax administrations are required to innovate rapidly, coherently with the pace of technological changes and external and internal

pressures. In doing so, they face budget constraints; therefore, there is the need to "assigning the right resources to the tax function's digital strategy" (EY, 2017, p.9). The megatrends that are affecting the taxation function are variegated and complex. Deloitte's report (2019) categorizes these tendencies referring to five elements: data (big data, data analytics, predictive data); mobile (sensoring, 3D printing, IoT personal data); social (social networking, crowdsourcing, and crowdfunding, digital currency); platform (unified compute); automation (robotic process automation, cognitive technologies). Hence, in the latest years, the public sector, and tax authorities, in particular, have experienced a process of adaptation to be able to best exploit the new opportunities that arise. Although undertaking such actions is extremely demanding and challenging, some tax authorities can be best prepared to face and to effectively perform the changes required. It is the opinion of the author that those who have developed dynamic capabilities are more likely prepared to embrace changes on the technological frontier, even though one must keep in mind the characteristics of the sector considered that could harm, or sometimes embrace, innovation.

Digitization is not only related to introducing new systems or processes, but it also necessitates that the whole organization is rethought and restructured accordingly. In fact, in the latest years, together with the megatrends cited above, shifts in the way of working have emerged too: "from having a homogenous workforce to a diverse one; from a hierarchical structure to collaborative teams; from traditional offices to smart workplaces; from being static to becoming agile; from binding innovation in a sole department - i.e., the innovation department - to embracing innovation from everyone; shifting from a controlling leadership to an inclusive digital leadership; inverting the relationship 'technology drives people', into 'people drive technology'" (Deloitte, 2019, Figure3, p.6). Moreover, regarding internal processes, "digitization enables and requires both processes and labor to flex as needed, allowing tax to respond to business needs as they occur" (Deloitte, 2019, p.7).

Resourcing is another function that has been strongly affected by the digitization wave. Today tax authorities are facing a choice to adopt the solution that ensures the highest value creation given the structure and resources. Particularly, the options are adopting an insourcing model, an outsourcing model, or an operating model. The first model is particularly suitable "when paired with smart decisions about headcount reductions or functional reorganizations, process improvements, and tax technology enhancements"

(Deloitte, 2019, p.8). On the other hand, the second model consists of relying on a third-party provider for specific functions, for example, the global compliance function, while keeping in-house the more strategic ones. Lastly, the operating model consists of delegating to a third party all the tax functions. This is usually adopted by such organizations that are required to perform modernization of the technology used. There is no one best model, the choice of which one to adopt and its efficacy strongly depend on the organizational culture and needs (Deloitte, 2019).

Learning is a key point that emerges in the discussion of digitalization in the public sector. The speed of technological changes is extremely high; therefore, actors ought to sense, seize and adapt to these shifts in a timely and effective manner. One effective way to learn within the public sector is the use of discussions and brainstorming sessions among countries' representatives. With this regard, the OECD coordinates an intense and ongoing dialogue among national tax authorities, thus sharing knowledge and increasing the effectiveness of implementing digital practices (EY, 2017), and tackling the problem of tax avoidance - refer to BEPS 'Base Erosion and Profit-Shifting guidance' – (Deloitte, 2019). However, we can argue that taxation is a local matter; therefore, it is necessary to keep in mind the differences among countries and, therefore, that it is not always true that a digital system is effective and efficient regardless of the context in which it is implemented.

All the changes brought by the technological wave could undoubtedly result in improvements in the way of doing taxation. However, one must also consider the obstacles and difficulties that come along with them. Together with data comes the privacy issue: the tax authorities are required "to safeguard the confidentiality of data and to ensure that the data may not be used by third parties" (ICC BRITACOM, 2020, p.5). Data protection is therefore crucial for them to operate effectively, also considering that taxpayers' trust and reliance is an essential ingredient for taxation functions to be efficient and effective. The context, and particularly the legal framework in which the tax administrations operate, determine how and how fast they can process, utilize and work on personal data. The legal aspect is, therefore, another crucial aspect that must be considered in this discussion. Moreover, another obstacle that taxation authorities might face is the increased costs required to update and modernize systems and processes, both in terms of money, time, and use of resources.

3.2 Presentation of the case: the Norwegian Tax Administration

Tax Norway has been hit by the digital wave, as well as other organizations. However, it has always shown the will of riding that wave instead of being overthrown by it. Actually, Tax Norway has been at the forefront of the technological frontier by early-adopting digital systems and processes and shaping the organization accordingly. Back in the 1980s, the organization started to introduce ICT instruments and from that moment on has approached new challenges with a flexible and proactive attitude. How was the organization able to ensure such an attitude? What capabilities developed over time have enabled Tax Norway to deliver its performance effectively and efficiently? This is the purpose of the research and what the study aims at investigating.

The context

The analysis of a case cannot disregard the context in which it operates. Hence the characteristics of an organization are strongly affected by its external environment. The tax system in Norway is similar to other countries; it is based on both direct – such as income and wealth taxes – and indirect tax – such as the Value-Added Tax, VAT.

All Norwegian workers must have a tax card (*Skatteekort*) which can differ in the tax rate applied according to the amount earned. The tax card is linked to the Norwegian birth number (*fødselsnummer*), which is a peculiarity of Norway: each citizen must register to the National Population Registry, and it is assigned an ID that serves as a recognition code. This ID serves to perform several activities in Norway, from borrowing a book from the public library to benefiting from the welfare system.

The primary goal of the Norwegian Tax Administration (NTA) is to secure a financial basis for public activities by paying taxes, fees, and other claims (Tax Norway, Annual report 2019). In the latest years. Society shows positive attitudes towards the organization. In fact, the yearly surveys that Tax Norway administers show an overall satisfaction among taxpayers. The relationship with the citizens and businesses is crucial for the well-functioning of the tax administration. Hence it strives to facilitate communication through several channels (physical offices, telephone, chats, email/contact form, social media).

Moreover, a significant level of trust characterizes the Norwegian society, and this is crucial because, as reported by the OECD in the Forum of Tax Administration, the "trust in the fairness of the tax administration (and also the wider tax system) is of high importance for the sustainability of the tax system and for maintaining and enhancing compliance" (2017, p.18).

The organizational structure

The Norwegian tax authority consists of a directorate and six divisions with nationwide responsibility. The current structure results from a significant restructuring project in 2019, moving from five region-based offices to six divisions with extended national tasks (Tax Norway, Annual report 2019). The tax offices handle the tasks on a country level; they are not region- or municipality- specific. This aspect has been the central point of one of the two extensive restructuring processes that have been implemented within the organization. Continuing with the structure of Tax Norway, the directorate consists of four departments representing the contact points with the Ministry of Finance: the Strategy Department, the Legal Department, the Human Resources Department, and the Communications Department. The divisions, each with nationwide responsibility, are Information Management Division, User Dialogue Division, Effort Division, Collection Division. Among the divisions, the IT Division and the Development Division have a support function for the core operations and the directorate (source: Skatteetaten website, translated). A brief explanation of each division is provided:

- The Information Management Division is specialized in gathering information, ensuring quality information, managing and making information available both internally and externally;
- The User Dialogue Division represents the point of contact with the users. It is responsible for guidance, control, and determination of taxes and fees;
- The Effort Division deals with high-priority areas and complex matters for which it determines taxes and fees;
- The Collection Division's main task is to collect taxes;
- The Development Division aims at developing and building new knowledge to enable the organization fulfilling the social mission;

- The IT Division supports the whole organization with a well-functioning IT structure in the short and long term.

Refer to Figure 1 to have a better understanding of the structure of the organization.

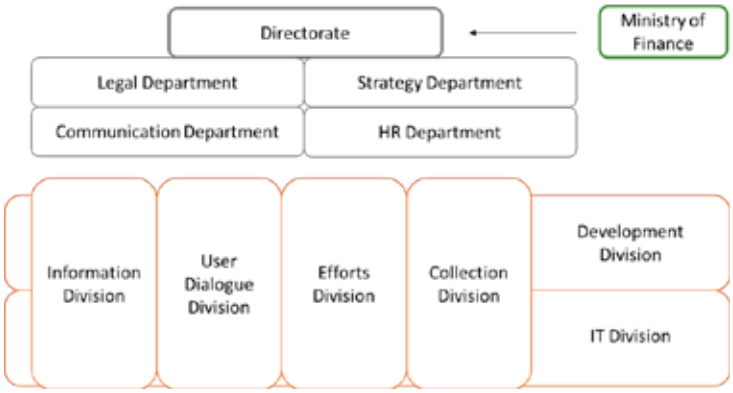

Figure 1: NTA organizational structure. Source: Skatteetaten website. Revised

An overview of the structure is necessary to understand better how the organization operates. In fact, organizational design is a crucial aspect when discussing the ability to adapt and innovate. Moreover, this brief introduction would help the reader have a better overview of the roles and relationships of the different departments and divisions.

4. Research objective and methodology

4.1 Research objective and strategy

This study aims to contribute to the dynamic capabilities literature on the public sector, thus contributing to the broader topic of how established firms can renew themselves in an optic of technological shifts. Moreover, it wants to be useful for professionals who work in the public sector to have a better understanding of how dynamic capabilities, in terms of sensing, seizing, and transforming capabilities, represent a crucial aspect for public actors and how such capabilities evolve over time, with a particular interest on the role of path dependency.

The methodology used in this study consists of a qualitative case study approach to explore how tax authorities develop dynamic capabilities over time that enable them to deal with technological uncertainties and embrace technological innovations. A case study consists of an empirical examination of a phenomenon in its real-life setting (Saunders *et al.*, 2019) and best fits the studies that investigate the "how" and "why" of a phenomenon (Yin, 2015). The data are mainly non-numerical, collected through interviews and company reports. The qualitative approach is the one that best suits this type of study since it aims at developing new insights (Saunders *et al.*, 2019). To investigate the phenomenon, the opinions and stories of high-level employees from the case study company are listened to and examined. They are further enriched by analysing the company's reports spanning an extensive period and compared with data about tax administrations internationally.

The case study has as subject the company Tax Norway, also called *Skatteetaten* or Norwegian Tax Administration (see *Research setting* chapter). It is an embedded single case study because it considers the whole organization and multiple departments (Yin, 1984). It consists of process research which tries to capture time by asking about past events (Langley, 1999). The interviews are carried out in one session in January 2021; however, the questions posed cover a period that starts from the late 1980s until today due to the very purpose of the research of understanding the "process" of dynamic capabilities development.

According to Saunders *et al.* (2019), one should select a case study for its unique characteristics. The case study subject is the Norwegian Tax Administration (NTA), and its

uniqueness stands in its ability to be at the forefront of the technological frontier. Investigating Tax Norway would highlight the characteristics that enabled it to develop the dynamic capabilities necessary to rapidly and effectively adapt to technological innovation.

This study adopts a process perspective. According to Langley *et al.* (2013, p.1), process studies "focus attention on how and why things emerge, develop, grow, or terminate over time. […] Process studies take time seriously, illuminate the role of tensions and contradictions in driving patterns of change, and show how interactions across levels contribute to change".

Research design

The research design "is the general plan of how you will go about answering your research question" (Saunders *et al.*, 2019, p.173); hence it must be coherent with what the study wants to investigate and how. Defining research design allows the researcher to carefully define how to "get from here to there" (Yin, 1984, p.20), including in the middle a series of questions that inform the implementation of the methodology that best addresses the aims of the research.

The literature stresses the relevance of possessing dynamic capabilities for the private actors. However, as extensively presented in the previous sections, the public context is increasingly hit by the wave of technological uncertainty, thus representing a quest to develop such capabilities. This project focuses on the public context and wants to investigate how the sensing, seizing and transforming capabilities develop over time, thus investigating the effect of path dependency on dynamic capabilities. It consists of an exploratory study to further develop the topic considered (Saunders *et al.*, 2019). This approach consists of asking open questions that allow the researcher to gain new insights on the phenomenon or clarify the subject's current understanding (Saunders *et al.*, 2019). Moreover, adopting an exploratory approach permits continuous and iterative adjustments of the research focus following the new intuitions gained. Hence, this approach entails high flexibility, broadness, and in-depth.

A case study represents the best research strategy to perform qualitative research that aims at further investigating a topic and the underlying causes of the phenomenon, which the existing literature is not extensive enough. "A case study strategy has the capacity to

generate insights from intensive and in-depth research into the study of a phenomenon in its real-life context, leading to rich, empirical descriptions and the development of theory" (Saunders *et al.*, 2019, p.197). This thesis is a case study of how a public agent - i.e., the tax authority – enables technological innovation and adaptation over time using dynamic capabilities.

Research approach

The approach used is a combination of deductive and inductive reasoning. The deductive approach consists of testing the theory, while the inductive approach aims at developing new meanings from the data collected (Saunders *et al.*, 2019). A deductive approach is used to understand the context of dynamic capabilities in the public sector, set the initial research question of the study, and draft the first version of the interview guide. Successively, the data are approached inductively to grasp new and unexpected findings and, consequently, refine the interview guide and the research question accordingly. This study deploys an iterative process according to which the research question, the data collected, and the theoretical framework are continuously updated and adapted coherently with what emerges. The choice of using an inductive approach is coherent with the limited literature on the topic explored. Hence, through induction - which is characterised by an unstructured methodology - it is possible to grasp new insights. This approach allows a high degree of flexibility that best suits the exploratory aim. However, focusing only on this reasoning method could be time-consuming and would require a high demanding commitment by the researcher (Saunders *et al.*, 2019). To overcome these critical issues and provide a more complete analysis, a deductive approach is also implemented. Notably, the theory provides direction for the research, and the empirical findings are compared with the existing literature, thus identifying a gap and contributing to fill it in. This matching is “about going back and forth between framework, data sources, and analysis” (Dubois and Gadde, 2002, p.556). The approach adopted can resemble the abductive reasoning, which consists of “collecting data to explore a phenomenon, identifying themes and explaining patterns, to generate a new or modify an existing theory which you subsequently test through additional data collection” (Saunders *et al.*, 2019, p.153).

This study investigates how tax administrations adapt and embrace technological innovation through the development of dynamic capabilities over time. This topic narrows down the more general investigation on dynamic capabilities to considering a particular type of actor - i.e., tax authorities – and adopting a process perspective, thus carefully considering the "time" aspect.

4.2 Data collection

This study has been carried out with the support of the RaCE (Radical Technology-Driven Change in Established Firms) program at NHH university. The initial part of the collection of primary data has been performed with the help of my supervisor at NHH, Professor Christine B. Meyer, who helped me in being more confident in the interview process. This section aims at explaining the type of data, how it was collected and how it was managed.

Data sources

This study uses both primary and secondary data of non-numerical type. The combination of data sources allows performing a triangulation, hence ensuring the veracity of what data is telling and strengthening the methodological procedure (Denzin, 2012).

The primary data consists of semi-structured interviews with high-level managers from the divisions and departments of the organization that were depicted as the most relevant for the research topic (see Table 4). The use of interviews is coherent with the qualitative type and exploratory aim of the study because it encourages the emergence of new insights. Moreover, utilizing a semi-structured type permits a predetermined list of key themes to be tackled, meanwhile leaving the informant free to follow his/her thoughts to uncover unexpected elements. This way of doing well suits the adoption of an abductive approach (Saunders *et al.*, 2019). Access to the case company has been made possible thanks to the supervisor at NHH, Christine B. Meyer. Subsequently, a key contact person within Tax Norway was contacted via email, who indicated the relevant informants for the research. Eventually, the interviews with the selected informants have been carried out via an online communication platform.

The secondary data are qualitative, non-numerical data represented by the organization's annual reports, carefully translated from Norwegian to English. Being this a process study, the reports analysed covered a period from 2003 to 2019 (please note that 2003 was the first year available on the financial section of the organization's website).

Sampling

The method that best suits this qualitative case study research is a non-probability sampling; in fact, the case has been selected following subjective judgment and for a particular purpose. The non-probability sampling consists of unequal probabilities for the cases to be selected for the sample (Saunders *et al.*, 2019). Although this method is extremely useful for getting insights from peculiar samples, the findings are not generalizable to the whole population in a statistical sense. However, the reader must take in mind that this research is not interested in representativeness but more in highlighting new insights on the topic considered. The methodology used for this study was purposive, theoretical sampling. With purposive sampling, the researcher can select the case that enables to best answer the research question (Saunders *et al.*, 2019). Theoretical sampling is a subset of purposive sampling that is particularly suited for emerging theories. This type of sampling allows for informants to be chosen intentionally for the cause, with the possibility to approach additional ones depending on the emerging insights (Saunders *et al.*, 2019).

The selection of informants for this study has been carried out with the aim of gaining insights on the phenomenon investigated, hence how tax administrations develop dynamic capabilities to embrace technological innovations over time. How many informants to have in the study has been defined with the reaching of the theoretical saturation. Theoretical saturation is defined as the point "when data collection ceases to reveal new data that are relevant to a category, where the properties or dimensions of categories have become well developed and understood, and relationships between categories have been verified" (Saunders *et al.*, 2019, p.670). Therefore, the final number of informants have been defined once the researcher established that no new meanings were emerging and a reasonable understanding was reached.

The informants for this research are seven people who currently work or have previously worked within the Norwegian Tax Administration (refer to Table 3). The informants are

high-level and top-management employees. The informants work in divisions and departments particularly relevant for the purpose of the study, naming the Development Division, the IT Division, the Information Division, and the Strategy Department. A key characteristic that was considered in the selection of informants is the length of their presence within the organization: periods of more than five years were considered the minimum acceptable length for participating in this study.

Interview informant	**Role and time**
Informant 1	General director (18 years). sub-director (10 years)
Informant 2	Senior Advisor, Div. Development (5,5 years, now)
Informant 3	Senior Advisor, Project manager, Div. Development (34 years)
Informant 4	High-level employee, Dept. Strategy (6 years, now). Project manager, Div. Innovation (4 years)
Informant 5	High-level employee, Div. Information (2 years, now). Div. IT (16 years)
Informant 6	Project manager, Div. Development (10 years, now)
Informant 7	Manager, Div. IT (17 years, now)

Table 3: Overview of informants

Primary data: qualitative semi-structured interviews

This study has an exploratory purpose, and the use of open questions and semi or unstructured interviews coherently aims at "discovering what is happening and gaining insights about a topic of interest" (Saunders *et al.*, 2019, p.186). As suggested by Saunders *et al.* (2019), an interview guide is followed to drive the discussion. Having a pre-determined list of questions, or main themes, helps the research to carry out the interview smoothly and to effectively tackle the topics interested. In fact, one of the drawbacks of using unstructured interviews is that the interviewee could wander off. The trade-off between freedom of speech and guided discussion must be carefully balanced to allow unexpected meanings to emerge that are coherent with the purpose of the research.

As previously mentioned, the initial draft of the interview guide is informed by the literature, hence deductively. However, as suggested by Charmaz (2011), the analysis started early in the process, so that the interview guide is iteratively modified once interesting new elements are raised by previous informants. The list of pre-determined questions has been expanded with subsequent interviews so that it was possible to compare informants' insights.

Themes	Objectives
Introduction	Understand the background of the informant within the Norwegian Tax Administration, to also have a clearer picture of the history of the organization. Gather information regarding the department/division, roles and responsibilities, in order to have a better overview of the organizational structure and relationships.
Dynamic capabilities and digital innovation (process perspective)	Understand what are the capabilities that allow Tax Norway to embrace technology adoption and how they develop overtime. Several sub themes are investigated: - Organizational structure: how the structure of the organization influenced the trade-off between flexibility and efficiency - Instruments: how and what instruments are used to embrace change - Relationships: how internal and external communication affect the capacity of the Norwegian Tax Administration to sense, seize and adapt - People: how and what people (both internal and external to the organization) play a crucial role in allowing the organization to be digitally advanced - Context: how the context influences the ability of Tax Norway to innovate, what elements of the context are the most crucial. Do specific events trigger the change or is a continuing process?
Digital status	Understand how Tax Norway utilizes technology.
Comparison	Understand how the organization's digital situation is perceived compared to other actors, both nationally and internationally.
Challenges and opportunities	Spot the perceived challenges that the organization faces regarding digital innovation. Highlight what are the strengths and weaknesses of the organization.

Table 4: Main themes of the interview guide

The interview process

The interview process started in December 2020 when the informants were approached by the key contact person within the Norwegian Tax Administration or by my supervisor at NHH, Professor Christine B. Meyer. Then, the interviews were set and carried out in January 2021. The first interview (Informant 1) was a two-on-one interview; in fact, the supervisor and I were conducting the interview together. That has been extremely useful in understanding better how to approach the subsequent ones, which were one-on-one interviews. It was, unfortunately, not possible to personally visit the office due to safety restrictions; however, the researcher believes that the information gathered through intermediated channels is sufficient for the purpose of this study.

An introductory investigation about the informants and the organization has been conducted before the interviews. Moreover, prior to the interview, the key contact person within the organization gave to the participants of the study information regarding the topic of the research, thus allowing them to prepare themselves for the interview (Saunders *et al.*, 2019).

During the interview, the discussion focused on facilitating the informant expressing perceptions, opinions, challenges, and personal experiences about the topic considered. The questions posed are open and allow the informant to develop discussions and provide insights. Moreover, although there was a set of questions - i.e., interview guide (see Appendix B) - the interviews have been mainly directed by the discussion that emerged throughout the conversation. Nonetheless, questions related to key aspects that wanted to be investigated have been asked, thus gathering evidence.

The interviews are conducted via an online communication program (*Microsoft Teams*); each of them lasted about one hour and were held in English. All the interviews were recorded through the recording functionality available on the platform to be transcribed later on. This allowed the researcher to focus on the questions to pose and to actively engage in the responses given by the interviewee, and, additionally, to have an accurate and unbiased record (Saunders *et al.*, 2019). The recorded interviews have been deleted as soon as the transcriptions have been completed. Notes were taken during the interviews about key elements, unexpected elements, and relevant non-verbal signs (e.g., laughter, sarcasm, hesitation, etc.). Before starting the interview, the informant was requested to give permission to record it. Additionally, each interviewee was requested to sign an informed consent form, thus informing the interested person about the details of the research and ensuring the correct handling of personal data and privacy issues. The form was drafted by the RaCE research centre at NHH university (see Appendix A).

Before starting the interview, the researcher made a brief recap of what the research was about and what intended to investigate, explained the technical aspects of the interview process, and eventually asked to sign the consent form and to give permission for recording. To start the interview, the informant provided an initial presentation through questions related to the role and position within the Norwegian Tax Administration. Warm-up questions allow the informant to gently enter the topic and to get comfortable with the interview, thus affecting the quality and relevance of the conversation. Subsequently, questions investigating the topic were posed – for example, questions regarding the perceived level of digital innovation, how Tax Norway handles digitization, how processes changed over time, what features and capabilities enable the organization to be at the forefront of the technological frontier, and so on. The questions have been made in order to

cover a time span of about thirty years (from the 1980s to today) to have a process perspective, always keeping in mind the period that the informant spent within the organization. All interviews ended with asking the informant if something else - that has not been covered during the interview - was worth mentioning, thus allowing for further unexpected insights to emerge.

Interview informant	Time	Type
Informant 1	1h 23minutes	Two-on-one
Informant 2	60 minutes	One-on-one
Informant 3	1h 15 minutes	One-on-one
Informant 4	60 minutes	One-on-one
Informant 5	60 minutes	One-on-one
Informant 6	60 minutes	One-on-one
Informant 7	1h 05 minutes	One-on-one

Table 5: Overview of interviews' time and type

Secondary data

The secondary data collected for this study consisted of the company's annual reports and relevant documentation, mainly qualitative data. These allow further evidence on the Norwegian Tax Administration. The annual reports are retrieved from the official website of the organization, therefore, publicly available. The documents cover a relevant timespan, from 2003 until 2019, and are published in Norwegian (except for 2010 and 2011 that are also available in English). They have been translated into English before performing the analysis. Due to the massive amount of information, the reports are analysed only in the sections that are considered relevant for this study.

4.3 Data analysis

This section explains how the data, after they have been collected, are analysed. The methodological concepts of coding, categorizing, and theoretical saturation guided the researcher in this phase (Charmaz, 2011; Saunders *et al.*, 2019). This study involves qualitative research; therefore, as stated by Saunders et al. (2019, p.638), "[qualitative research] involves the concurrent collection, analysis, and interpretation of data.". The analysis has been conducted inductively to enable unexpected findings to emerge, while the initial setting of the research was inserted into the topic of dynamic capabilities,

organizational agility, and digital transformation. The qualitative analysis can be divided into two phases: first, an initial coding that aims at informing the research question and providing a general understanding of the topic of the study; second, a focused coding that guided an analytical and exploratory analysis (Charmaz, 2014).

Considering the type of research and data gathered, mainly qualitative data, this study can be depicted as a process study. Process studies are defined as "studies that focus attention on how and why things emerge, develop, grow, or terminate over time. […] Process studies take time seriously, illuminate the role of tensions and contradictions in driving patterns of change, and show how interactions across levels contribute to change." (Langley *et al.*, 2013). A process study aims at explaining the relationship between events and outcomes. In simple words, as reported by Langley (1999, p.692), "do A and then B to get C".

This study identifies three layers of analysis. First, the identification of sensing, seizing, and transforming capabilities elements in Tax Norway. Second, understanding how such capabilities change over time. Third, delineating factors that enable the development of dynamic capabilities ("enablers") and those that obstruct it ("obstructors"). The first layer of analysis is informed by the literature, which explains the elements that support the development of each category's ability (see chapter Sensing, seizing, transforming). Moreover, elements that have not been addressed previously by the literature can be found. Later, particular attention is given to understanding how such capabilities evolve over time, thus stressing the role of time and path dependency.

The following sections present in more detail how the data analysis is performed.

Data preparation

The recorded interviews are first transcribed verbatim. Moreover, during the conversation, notes were taken regarding non-verbal communication that was perceived by the researcher as relevant (sarcasm, hesitation, etc.). This contextual information could provide relevant insights for the research by highlighting aspects that could affect the emergent meanings (Saunders *et al.*, 2019).

The annual reports were retrieved from the official website of the organization. The documentation available covers a time span from 2003 to 2019. The quasi-totality of the

reports is published in Norwegian; therefore, they have been translated into English before being analysed. As for the primary data, also secondary data have been examined by performing a coding analysis.

Initial data analysis and coding

The analysis started from the very beginning to inform the interview guide and to better define the data collection (Charmaz, 2011). Each interview contributed to the emergence of new meanings that extended and focused the subsequent interviews. During the interviews, notes and memos were taken to further build the theory (Saunders *et al.*, 2019). Additional notes during the transcription of the interviews helped in directing the study. Hence, the data collection and data analysis happened almost simultaneously.

The initial coding consists of analysing and labelling each sentence, so to provide an analytical overview. In qualitative studies, coding is about "naming segments of data with a label that simultaneously categorizes, summarizes, and accounts for each piece of data" (Charmaz, 2014, p.43). The initial coding involves also comparing data with data, thus finding affinities and discrepancies (Flick, 2014). This initial process was extremely useful for categorizing a large amount of data, hence facilitating the analysis, as well as informing the researcher about the main themes. Both primary and secondary data followed this procedure.

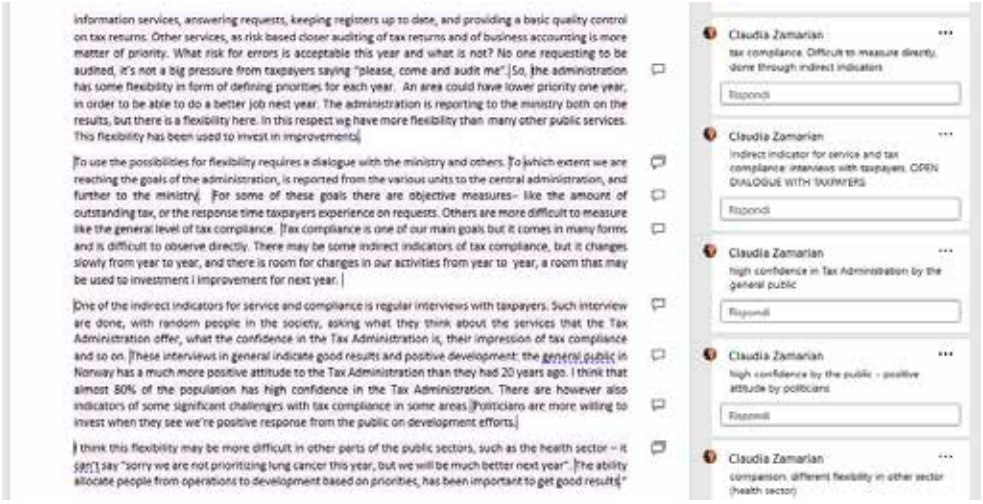

Figure 2: Example of initial, sentence-by-sentence coding

Focused data analysis and coding

Focused coding consists of a more directed, selective, and conceptual coding when compared to initial codes (Charmaz, 2014). This process allows to further analyse and categorize the most relevant initial codes and consequently developing insights and constructs (Charmaz, 2014). After the initial coding, the main concepts were gathered into highlighting exploratory understandings. In fact, focused coding "capture and synthesize informants' statements […] into conceptual categories" (Flick, 2014, p.159).

The literature informed the focused coding; in fact, the categories used are sensing, seizing, and transforming. The specifications of each category (refer to *Sensing, seizing, transforming* chapter) helps the researcher in categorizing the elements and identifying new ones. Moreover, having in mind what sensing, seizing, and transforming capabilities entail, allows us to highlight new elements that have not yet been addressed by the literature – those specified in Table 2. Furthermore, particular attention is reserved to delineate how such capabilities – that together represent the dynamic capabilities – evolve and change over time. Additionally, this phase of coding individuates the elements identified as "enablers" and "obstructors" that foster or prevent such capabilities from developing, thus enabling the organization to deal with technological uncertainty. amount of data, hence facilitating the

analysis, as well as informing the researcher about the main themes. Both primary and secondary data followed this procedure.

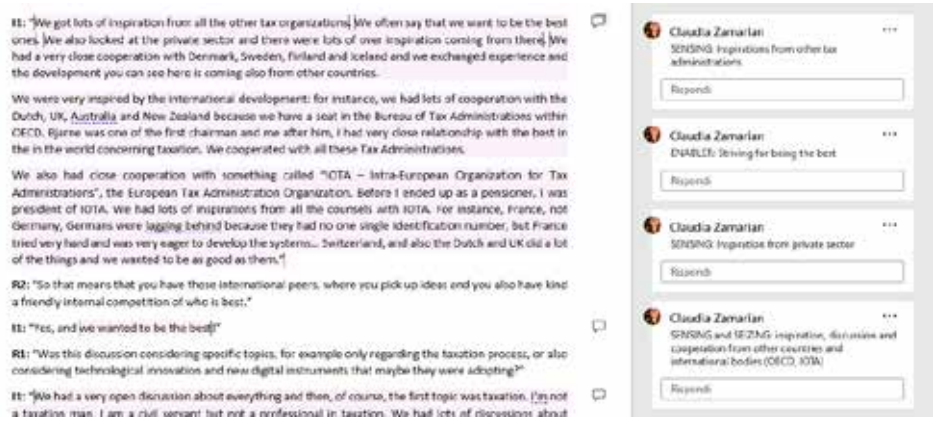

Figure 3: Example of focused coding

4.4 Quality of the research

This section discusses the overall quality of the research, with particular attention to the methodology used. The design of the research affects the quality and trustworthiness of the findings (Saunders *et al.*, 2018). Furthermore, the strengths and the weaknesses of the study are discussed and evaluated, thus resulting in higher transparency, strengthening the quality of the research, and providing sparks for future research.

The quality of the research is commonly related to two main aspects: *validity* and *reliability* (Saunders *et al.*, 2018). Validity refers to "what" you measure, whereas reliability to "how" you measure. Validity consists of *internal validity*, *external validity*, and *construct validity* (Saunders *et al.*, 2018; Yin, 2015). *Internal validity* evaluates whether there is a causal relationship between the variables and the outcomes; *external validity* has to do with the generalizability of the results; *construct validity* refers to the constructs used to measure the phenomenon, whether they are useful for measuring the intended variables. *Reliability* addresses the issue of replicability of the study by another research and getting the same results, hence whether replicating the research with the same design led to the same results (Saunders *et al.*, 2018). Although these concepts are useful for evaluating the quality of

research, they best fit the quantitative type of studies and are not suitable for qualitative research. Therefore, adapted concepts must be considered (Denzin & Lincoln, 1994; Lincoln & Guba, 1985; Saunders et al., 2018; Guba & Lincoln, 1989). *Dependability* is the parallel gauge to *reliability*. The *internal validity* is replaced by *credibility*, which aims at "ensuring that representations of the participants' social constructed realities match what participants intended" (Saunders *et al.*, 2018). *Transferability* takes the place of *external validity* and refers to the possibility to extend the findings to different settings. Furthermore, *objectivity* in quantitative studies is termed *conformability* and refers to the ability of the researcher and his/her interpretations not to interfere with the results. Given the qualitative type of the study, these concepts best suit the quality assessment of the research. The following subsections provide a detailed discussion.

Credibility

Credibility refers to the extent to which the research catches the accurate description of the phenomenon coherent with the participants' intentions (Saunders *et al.*, 2018). It consists of ensuring that the researcher's interpretation of the situation is as reliable as possible. There are many techniques to follow that aid in ensuring a high level of credibility, and this study adopts several of them.

Triangulating data - semi-structured interviews and company documents - helps in gathering information from different sources, thus allowing cross-checks and avoiding short-sighted interpretations (Guba, 1981). Secondary data are analysed to grasp an initial understanding of the company and further used to compare and enrich the information gathered through the interviews. The semi-structured interviews are carried out with people from different departments, which permits having different perspectives on the topic researched. Furthermore, throughout the analysis, the concepts emerging from the data were considered only when supported by enough evidence – e.g., mentioned by at least two informants. Finally, the role of the literature in this study has been particularly relevant and helped the researcher in developing explanations.

Credibility is also strengthened by the involvement of the informants in the process. Each participant was asked to review the transcription of the interview with the possibility to provide explanations or clarifications. Moreover, "member validation" is adopted in this study which consists of sending the findings to the participants to have their confirmation on the interpretations of their arguments (Guba, 1981).

The analysis of data through coding affects the overall quality of the research. "Coding helps researchers to see the familiar in a new light; gain distance from their own as well as their participants' taken-for-granted assumptions; avoid forcing data into preconceptions; and to focus further data collection, including the potential of leading the researchers in unforeseen directions." (Flick, 2014, p.156).

Having debriefing discussions and continuous dialogue with my supervisors helped in rethinking concepts and interpretations, thus fine-tuning the research and ensuring higher credibility. The RaCE program (NHH university) provides sessions with faculty members and master students to discuss the design of the research and findings, which brought valuable insights and critiques to improve the quality of the study.

Dependability

Dependability refers to the degree to which the research can be replicated by others (Saunders *et al.*, 2018), and this is achieved by carefully explaining how the data has been collected, analysed, and interpreted.

To ensure dependability, this thesis presents with scrutiny all the phases of the research process. Although the generalizability of the results is not what a case study research aims at, it is still relevant to ensuring dependability by following standards to which the research refers to. Anchoring the interview guide and the initial part of the analysis of data to the theory allows for higher traceability. Moreover, a "peer audit" process, which consisted of feedback on the procedures from my supervisor and by the RaCE research program members, highlighted criticalities of the analysis that were considered to improve the quality of the research (Guba, 1981).

Transferability

The aim of qualitative case study research is to explore new insights. The very nature of a case study relies on its uniqueness; therefore, extending the findings is not the goal. However, transferability refers to the extent to which it is possible "to transfer the study to another setting" (Saunders *et al.*, 2018, p.217), thus comparing the interpretations with those that emerged from another context. To ensure high transferability, it is necessary to clearly specify the context of the research and related interpretations. The chapter Research setting contributes to responding to this need, together with a careful description of the research design, of the findings emerges, and of the interpretation of results.

Conformability

The objectivity of the researcher is crucial for determining high-quality research, achieving conformability addresses this issue. The researcher should avoid biases that could infer the interpretations of the findings, thus resulting in subjective or deviated judgments. Conducting qualitative research often results in higher involvement of the research with the participants, and this could represent a threat to maintaining objectivity. However, having a clear research design helps in limiting this issue (Charmaz, 2014). As mentioned before, the methodology of the research has been clearly outlined, thus ensuring transparency and replicability. Moreover, the possibility to record the interviews allowed for a word-by-word transcription, thus avoiding misunderstanding and the interference of personal inclinations. Regarding the findings, I considered the trustworthiness of information when supported by at least two participants, and all the findings are presented along with direct quotes.

The biases that may affect the quality of the research are not only the ones related to the researcher. In fact, there are also risks on the participant side. For example, the retention of information for themselves or false responses. To overcome these issues, I tried to make the informants comfortable but maintaining appropriate distance and ensured their privacy by the provision of consent forms drafted by the RaCE research program (Appendix A). This document explains the purpose of the research and explicates the confidentiality of the data collected.

Limitations and ethical considerations

This study is carried out trying to ensure high-quality research and relevant interpretations of the findings. However, some limitations are present, and disclosing them is an integral part of ensuring transparency – thus quality – of the study and could result in insights for future research. Participants were asked to recollect memories from their past experiences working in Tax Norway. This might represent a shortcoming of this study which could lead to unclear and not very reliable reconstructions. Nonetheless, the time passed could have helped the interviewees better reflect on those experiences, thus providing more rational conclusions. Moreover, it must be underlined that this master thesis performs a case study research; therefore, the findings are not suitable for statistical inference. Future research could perform qualitative studies in different settings, in terms of geography or area of the public sector, or quantitative studies, to further investigate the phenomenon.

Ethics refers to the appropriateness of the researcher's choices and behaviours with regard to those who are the subjects of the study and those who are affected by it (Saunders *et al.*, 2018). Attention to ethical aspects has been addressed throughout the whole process. The formulation of the research topic and the research design have been defined by considering issues of feasibility. The data collection phase is carried out by ensuring correct handling of data and confidentiality to informants. The interviews have been recorded after explicit authorization by the interviewees and deleted after transcription, and each informant was asked to check the quotes reported in this thesis. The analysis and presentation of the data have been carried out, paying attention to sensitive information, conducting a balanced and objective analysis, and acknowledging the limitations of the study. Moreover, the researcher informed each participant before taking part in the study, asked for his/her permission to handle data conformed with confidentiality (see *Consent form*, Appendix A), and clarified the possibility to withdraw at any moment.

5. Findings

This part provides an in-depth presentation and analysis of the findings. To ensure a better understanding, the first section provides an overview of the evolution of dynamic capabilities over the period considered. The following section addresses the changes in sensing, seizing, and transforming capabilities more thoroughly and presents relevant quotes. Finally, the last section presents the enablers and obstructors to the development of dynamic capabilities to face technological uncertainty.

5.1 Dynamic capabilities in Tax Norway over time: an overview

The time span considered is of about thirty years, starting from the late 1980s until today. Throughout this period, the Norwegian Tax Administration has evolved to be able to face technological uncertainty and continuously deliver high public value. The way how it senses the environment, seizes the opportunities, and transforms has also changed.

In the past, the external opportunities were mainly sensed by top-level management. Initially, the greatest impact in sensing came from the top management, who was able to understand the need for change and from looking at the most modern tax administrations. From the interviews, it clearly emerged that the turning point in the 1990s for Tax Norway was triggered by the general director. That route change significantly affected the development of the organization, defining the new approach to technology and setting a legacy that still characterizes today's management. However, considering more recent times, it is the middle-level management (head of divisions, heads of departments) that represents the principal bearer for development. Moreover, the current sensing capabilities of Tax Norway are nurtured by engaging in open discussion with several external actors – the private sector, citizens, public agencies, and other tax administrations.

When it comes to seizing, the implementation of projects and pilots is undoubtedly the major element. By adopting a long-term overview, it is possible to spot some differences, particularly regarding the purpose behind them. In the early 90s, when the organization started the massive digitization, the projects served more as a validation tool to present to the

ministry and the politicians (to implement changes, the approval of the political side is dependent on the evidence highlighted by running pilots). The real option mechanism of these projects allowed Tax Norway to sequentially provide proofs for the initiative proposed, which consisted of "simple" adaptation to technology. Nowadays, this tool is particularly relevant for testing innovative ideas. Hence, it allows for small failures and subsequent learning. Over time, Tax Norway has tried to nurture the sensing and seizing capabilities by incorporating the forward-thinking approach in the overall structure – consider, for example, the Information Division, the Development division, and the Strategy division, the introduction of agile way of working and cross-sectional teams – thus not depending merely on the initiatives by top-level individuals. Moreover, Tax Norway employs open innovation mechanisms to effectively seize the opportunities. However, initially, it was primarily done to fine-tune the services offered, while nowadays it is more about indulging a new way of taxation that requires more cooperation among all the actors, referring to the so-called "ecosystem".

The opportunities seized then required an adaptation of the organizational structure. The most visible transforming capability that emerged from the Norwegian case is the renewal of the organizational structure. Alongside that, the adoption of a more agile way of working (e.g., DevOps teams and cross-sectional teams) has helped the organization become keener to take risks and deliver faster. The Norwegian Tax Administration experienced two main reorganizations in the time span considered, in 2007/2008 and in 2018. These were structural adaptations to the changes that the organization sensed and seized: transforming capabilities need to be deployed to effectively address the opportunities and challenges detected. The first reorganization integrated the services into regional divisions and aimed at bringing more competence and responsibilities over development to the professionals and trying to rebalance the great influence played by the IT offices. This represented the very first big restructuring of Tax Norway and was necessary to concretely address the changes that started in the 1990s. The reorganization in 2018 slimmed Tax Norway even more by structuring it into five divisions with nationwide responsibilities. The transforming capabilities of tax Norway mainly rely on organizational renewal and refinement of an agile way of working that allows for continuous alignment and realignment. The transformations, throughout the period considered, have enabled a leaner and more agile structure, thus

supporting more rapid changes. The renewal of the organization responds to the needs of a more digital and integrated society.

Although the Norwegian Tax Administration has collected great successes over time, some space for improvement is still present. For example, the organization has always been focused on delivering the best service for the users, and now it is working on improving internal efficiency. The greatest mission of Tax Norway today is to adapt to the current need for a more integrated way of managing taxation, which requires sharing data and close collaboration with other actors. Over time the focus shifted from technology to information and data. Quoting one of the informants, "technology is the enabler, but the information really is the key to drive through digitalization".

The figure below (Figure 4) summarizes the most relevant changes in the dynamic capabilities of Tax Norway throughout the period considered.

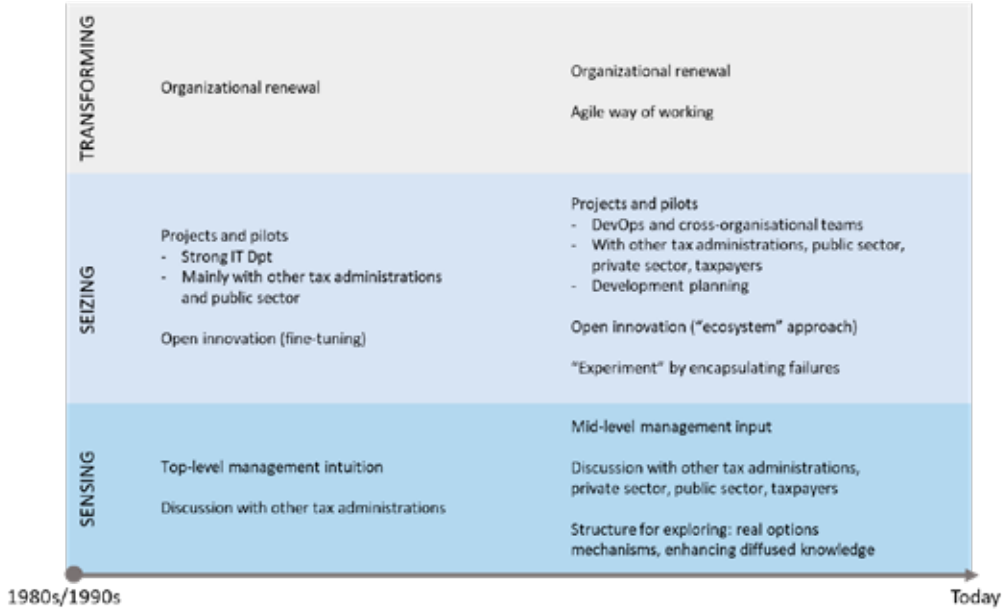

Figure 4: visual representation of the changes in sensing, seizing and transforming capabilities over time

The organization has gained trust and confidence over time, thanks to its successful performance - from the ministry, the politicians, the taxpayers, etc. This, on one side, resulted in increased reliability and support for pursuing new initiatives, but on the other, it augmented the "price" of failures, thus becoming also an obstructor to innovation. Why changing the way of doing if it is successful? That is the dilemma that Tax Norway needs to fight against to be able to be more adaptive and not resting on its laurels.

In the public sector implementing changes requires more time compared to the private sector, as you could also witness in established big organizations. The case of the Norwegian Tax Administration is an example of that. To reach an organizational renewal, which is necessary to ensure technological evolvement, the organization has to run lots of projects lasting several years and requiring large amounts of data to get approval. In between these restructurings, the organization runs smaller projects and pilots and engages itself with other actors in order to sense and seize the opportunities that may arise. It seemed like initially, in the early years, both the management and the ministry were atypically eager to change and develop. Thanks to that, Tax Norway renewed itself and became one of the most advanced tax administrations. Over time the organization acquired competence and collected several successes. Path dependency plays a double role in this case, both as an enabler and an obstructor. On one side, the great history of successes allowed Tax Norway to strengthen its credibility and to gain more support both from the public and from the ministry, thus allowing it to take more risk in innovative initiatives; on the other hand, having such high self-esteem could hinder future radical changes and experiencing failures could be extremely harmful when you are "at the top". This is what happens when you really succeed in building these capabilities: you gain confidence, but you also raise the expectations.

This study highlights the effect of "path creation" on both internal – legacy, culture, way of working, self-esteem - and external factors – confidence, expectations (Figure 5). Moreover, the time aspect in the public context affects several mechanisms: adaptation of the law, approval and implementation of projects, alignment of the business side of the organization to develop.

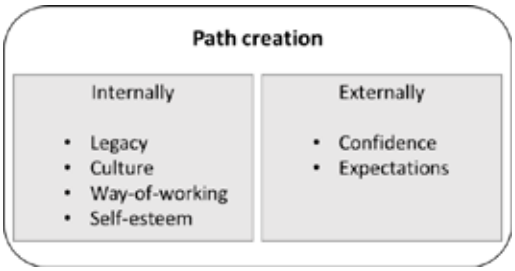

Figure 5: Effects of path creation in the public context

5.2 A focus on changes in sensing, seizing and transforming capabilities

Here it is presented in more detail what has been summarized in the previous section. Changes in sensing, seizing, and transforming capabilities are accompanied by relevant quotes.

5.2.1 Sensing

Sensing is about detecting signals, and it consists of having a strong peripheral overview (Schoemaker *et al.*, 2018; Teece *et al.*, 2016). From the analysis of the primary and secondary data emerged that the Norwegian Tax Administration relies on some instruments: leadership that individuates the need for change; real options plays and pilots; collaboration with and inspiration from other actors; inappropriateness sensing and knowledge enhancing mechanisms. The following subsections will provide more details on the evolution of sensing capabilities with underpinned quotes.

Leadership intuition: from top to middle level

Most of the first changes happening within the NTA found the initiator in the top management team. Particularly, the very beginning of the technological transformation of the organization started because of the General Director in the 1990s, who sensed that there was a need for modernization. But even in the later years, the top-level management was decisive in understanding the need for evolving. The relevant role of leaders within the organization is not only seen in the early days, but it is something that characterizes it even

today. The legacy left by the general directors that started the change within the Norwegian Tax Administration has strongly influenced the mentality of the tax directorate. However, the initiatives from the middle-level management (head of divisions, head of departments) have slowly substituted the intuitions of the top leadership, thus highlighting a more diffused culture for innovation.

	Citation	**Label (what the quote is an illustration of)**
Example 1	*"The former director general Bjarne Hope became a tax director commissioner, and he was the director of the big project converting common tax matters into this ICT system in tax, that was Tax Norway. That was the real start of it. He did a very good job during his time. He was general director for 11 years and what he did was, first of all, trying to make the old organization, a quite stiff and conservative organization, to do lots of pilots. He launched 20 different projects."*	Sensing: Top-level leadership intuition
Example 2	*"We (referring to top-level leadership) had the saying that "if you should be good tomorrow, you have to develop today". When X was appointed as general director the first speech to the leadership in Tax was "We have to do something different! We can't just continue these services without thinking about how we handle our purpose and taxation in Norway."*	Sensing: top-level leadership intuition
Example 3	*"Change is not driven top down, instead is driven from the middle up and middle down. So, the mid-level management, that I adhere to, is actually the driver or change in the government. It is heads of the sections, heads of the departments, heads of divisions and so on that are currently driving the change, that are challenging the leaders above, and they're demanding it of their workers below."*	Sensing: middle-level leadership input

Enlargement of collaboration, inspiration, and learning from external actors

The Norwegian Tax Administration is extremely involved in learning and gaining insights from others, hence adopting an open innovation approach. Such actors comprehend other tax administrations, international bodies (e.g., OECD), the private sector, taxpayers. By looking at the external environment, the NTA has been able to understand what was needed to be in step with the technological development and the changing needs of the society, and sometimes to anticipate it. In the early years, looking at and engaging in discussions with other tax administrations gave the NTA a lot of inspiration and suggested "safe" ways for modernizing (because already adopted by countries with similar conditions). Nowadays, the interest of the organization goes beyond the public sector; hence, it also considers the private and the international context. For example, by looking at the big tech companies, Tax Norway realized the importance of information and agile structure, thus triggering the

reorganization that happened in 2018. Additionally, the organization listens to the taxpayers through involvement and communication mechanisms, such as surveys, thus gaining direct feedback on what they perceived.

	Citation	Label (what the quote is an illustration of)
Example 1	*"The current organisation couldn't go on into the future and we couldn't then achieve what we hoped for. When we looked at what were the key drivers behind the success of the so called "big tech companies", technology was one of the reasons, but what was becoming more and more obvious was that information was their gold, it was the key resource."*	Sensing: inspiration from private sector
Example 2	*"We got lots of inspiration from all the other tax organizations. We had a very close cooperation with Denmark, Sweden, Finland and Iceland and we exchanged experience and the development you can see here is coming also from other countries. We were very inspired by international development: for instance, we had lots of cooperation with the Dutch, UK, Australia and New Zealand because we have a seat in the Bureau of Tax Administrations within OECD."*	Sensing: inspiration from and collaboration with other tax administrations and international bodies
Example 3	*"Learn from the best tax administrations abroad. If this could work in, for example, Denmark, then it's not too risky to introduce it here, and the politicians will be more likely to accept something that is already working elsewhere. In the Nordic countries this kind of cooperation has been important also for transforming the payroll reporting. It was established in Denmark in 2008 and we established it then in 2015."*	Sensing: learning from other tax administrations

Developing a structure for exploring: real options plays and diffused knowledge

Running pilots represent a crucial instrument for the Norwegian Tax Administration in understanding whether some opportunities may arise. They were used in the early years for exploring the environment and detecting changes, and nowadays, to additionally prove the enhanced performance of adopting artificial intelligence and other forward-thinking systems (for example, using drones to detect properties). With the latest restructuring of the organization, the Development Division, and particularly the Innovation section, is the part of the organization which is left with more freedom for exploring. The evolution of the structure of the NTA supports its capability in detecting relevant signals. Particularly, the Development division, the Strategy division, and the Information division show increased strategic thinking and attention towards external and internal stimuli for innovation. Scouting real options mechanisms have always been adopted by Tax Norway, but over time it has developed a structure that enhances the exploratory function.

	Citation	Label (what the quote is an illustration of)
Example 1	*"The pilot project I was working on was a result of a long-term planning process, taking place in the first half of the 1980s. This planning project was initiated by the IT-department, but was involving the whole management of the tax administration …The results from the project indicated that the consequences of applying information technology in taxation would be quite large, it could have a huge impact."*	Sensing: pilot projects to highlight weaknesses and sense opportunities
Example 2	*"The whole Development Department [composed by Analysis Dpt., Business Development Dpt., Innovation Dpt.] doesn't have any actual operational tasks at all. So, the Analysis Department develops models that are put into production, the Business Development Department does contribute into the projects, which are obviously development, and Innovation Department just does an early-stage innovation process, like design sprints and all that. But we also have to produce knowledge products, as we call them, which are kind of interpretations and analysis of either the world, or parts of the world, the state of the world, or basically within Norway, often, as is, or thoughts of what is to come, we could come, or should come."*	Sensing: Development department role
Example 3	*"Overall, in the Strategy where I work now, it's more like trying to interpret some of the information and trying to see if we can formulate some strategy ideas from them. It's a sort of identifying important topics, to facilitate the strategy for the top management."*	Sensing: Strategy Department role
Example 4	*"Now, I'm working with information management, more on a strategic level: what is Tax Norway's role in information management in Norway, in the broader society, how do we interact with the rest of the society – both the rest of the public sector and the private sector. Mostly concerning data sharing and new possibilities for data sharing. So, I have sort of a free role: I read a lot about what's going on in the rest of the society and try to transform that into knowledge about what is the future development of Tax Norway in that perspective."*	Sensing: Information Department

Enhancing communication within the organization supports the emergence of ideas and the recognition of needs—mechanisms such as meetings and discussions among managers of different divisions and cross-organizational development processes. Spread knowledge among the NTA's units strengthens the importance of development and also enables operational units to deal with innovations. However, this can be difficult in a big and public organization like Tax Norway, and it is not always effective. Throughout the years, the structure and processes changed with the goal of promoting diffused knowledge around innovation and fostering development also in the more operational units. Nevertheless, it is still hard to strike a balance between daily operations and innovation.

	Citation	Label (what the quote is an illustration of)
Example 1	*"We do also have innovation or development capabilities within the operational divisions. That's also important because they often do the things closer to them, to improve the operations of today and to introduce lean improvement and so on. And that's happening a lot in the operation divisions and that's important because they're close to the action and they do know the details, what's happening, and so they're best suited to do that. Whilst the kind of development that we do [refer as the Development Department] is more on an organisational level."*	Sensing: development capabilities within operational divisions
Example 2	*"...But there are mechanisms to try to share knowledge about what we're trying to do and what they are actually doing, what development initiatives they have, projects and so forth. So, there are mechanisms to coordinate and create transparency."*	Sensing: sharing and coordination mechanisms
Example 3	*"But as I'm in the Directorate of the overall structure, we are trying to create sort of processes that span different divisions so that we are trying to involve them in the type of work we are doing."*	Sensing: cross-divisions processes

5.2.2 Seizing

Seizing consists of implementing actions to take advantage of the opportunities that emerged (Schoemaker *et al.*, 2018; Teece *et al.*, 2016). To effectively address what is sensed, the Norwegian Tax Administration strongly relies on exploratory investments and sequential real options strategy through the running of projects and pilots. Additionally, the collaboration with other actors enables the organization to implement actions through open innovation processes. The analysis of the data highlighted the limited possibility for Tax Norway to freely experiment. Public bodies are subordinated to ministries and politicians who require pre-established planning and who often privilege the correct handling of daily operations rather than the exploration of potential development. Nevertheless, the NTA has developed ways to experiment, learn and embrace failure throughout time. The next subsections present in-depth the main elements and their changes over time, accompanied by relevant quotes.

Consolidating exploratory investments and real options strategy

The way of implementing new systems and introducing new processes in NTA strongly relies on running projects and pilots. The organization had extensively used this mechanism starting from the 1990s when the general director of that time introduced it convincingly. From that moment on, Tax Norway has developed particularly through projects and pilots that can be seen as a sort of real options strategy. Throughout time the organization got

better at adopting such mechanisms, which enable for a gradual introduction of innovations. Adopting this kind of strategy allowed the organization to introduce new mechanisms and tackle the technological opportunities that emerged with a prudent but yet effective approach. In the first years of the time span considered, the projects were more about modernizing the internal processes coherently with technological progress – i.e., introducing computer screens, moving the operations on digital systems, automatizing the handling of tax returns –, took more time and experienced more reluctance. Over time, Tax Norway made running projects its way of doing for adopting technological innovations.

In the 1980s, the proposal of new projects was initiated by the IT department and entirely managed by it. The general director of that time understood the need for spreading the leadership of projects among the professionals, thus promoting the control of projects by the business units and consequently allowing them to think innovatively. Nowadays, the Norwegian Tax Administration strongly relies on projects to innovate, and it has developed high capabilities in doing so. Typically, the owner of the project is the business side of the organization, but the resources come from the IT side. This is perceived as a limitation by some within the organization because it could result in slowing down the adaptation process. What the NTA is trying to achieve lately is shorting the learning loops and responding quickly to outside changes by bringing some of the projects more towards the business side of the organization. Therefore, the main issue that emerged is the lack of pre-allocated resources for development and innovation. Over time, the introduction of DevOps represented a crucial change in how projects were handled. It means a much closer link between the development and the operational side and continuous delivery on a very complex set of systems.

The use of pilots also responds to the necessity of getting approval from the ministry of finance and the politicians. In fact, the very nature of public organizations and their complicated agent-owner relationship requires more certainty and stability, and therefore in order to get some changes done, there is the need to provide results and evidence first. The usual procedure for approving a proposal starts from the tax administration to the Ministry of Finance. The latter has the responsibility for communicating it to the politicians to get support for necessary budgets and legal changes. This was undoubtedly harder at the beginning, in the 90s when the first projects were suggested. But the NTA gained confidence

and trust over time thanks to the great variety of successful projects. However, in the early years, when Tax Norway had to first introduce technology, the ministry was particularly eager to give support. Whereas today, given the great stability gained, it seems that the support of politicians for forward-thinking development initiatives is harder to get.

Public actors must follow and comply with strict procedures to implement changes, consisting of getting approval by the ministry, dealing with pre-allocated resources, providing extensive data about the initiatives, etc. Therefore, a crucial tool for developing purposes is planning. Developing strategic plans allows Tax Norway to analyse the current situation and set priorities for the upcoming years. Writing black on white what the organization needs and aims to do results in a more effective seizing of the opportunities. Moreover, the possibility to adapt these plans on their way - representing a sort of real option mechanism – enhances the adaptive capabilities of the organization.

	Citation	**Label (what the quote is an illustration of)**
Example 1	*"What I did first was to develop new ICT systems for all the areas that we handled, for instance for citizens, tax returns for citizens, taxation of businesses and companies and VAT. These three major projects, at that time, cost around 500 million Norwegian crowns. So, we had three major projects going on in parallel in the 90s. …. So, this was the basis of who made it possible for Tax Norway to develop all the services that people are thinking about when they say that Tax Norway is so modern and so user-oriented and so on."*	Seizing: pilot projects to introduce technology
Example 2	*"During the last decades much of the development has been organised as large projects based on proposals from the tax administration to the ministry, and financed through separate budgets from the ministry. These projects have involved staff from all parts of the organisation, operational as well at development and management. The top management of the tax administration, as well as representatives from the labour unions have been parts of the management board for these projects."*	Seizing: pilot projects for development
Example 3	*"It was needed to have the professional lines on board, in leadership. We had to put the leaders of the core services in the leadership of the development. They had to be on board and how should you get them on board when they don't have the responsibility? So, what I did was to say that we had to let the professional departments have the responsibility and decisive votes of course."*	Seizing: leadership of the professionals
Example 4	*"I think it's about looking at development and digitalization as a natural part of the day-to-day operations. And not like something that needs to be set aside for the IT Department. But, of course, we have a very good and professional IT organization, so we need to preserve it as well, but I think we still need to put more responsibility on the managers. Also, because one of the key things we have identified is about realising internal benefits from our*	Seizing: role of IT, day-to-day operations versus development

	digitalization. I think that if you want to be an adaptive organisation still you need to have room for doing development continuously and also within very much shorter cycles bringing news services and functionalities into services."	
Example 5	*"To convince the ministry and the politicians, it was necessary to show that the administration was able to get good results from these investments. The ministry said "okay, we see the need to invest in this, but what will be the results? Will there be results for the taxpayers? Will the taxes be more correct, with more tax revenue? Can the future budgets for operations be reduced?". And that was a long discussion. And one of the things we had to do was to demonstrate results, through pilot projects, for the ministry and for the employees. So, the administration first got some money for pilot projects based on the current tax rules."*	Seizing: using pilots to provide evidence and get approval of politicians and ministry
Example 6	*"The work typically starts with a project mandate approved by the management. The mandate can be to investigate and make proposals for improvement in a specific area. Some resources are allocated to the project group for a defined period. The resources could be staff with special competences in the area, from business units, from development, from IT, or external consultants. The plan has milestones, decision points and reporting requirements - usually to a steering group. … Preparing large projects, to be approved by the Ministry of Finance, often requires many resources and time. The material produced must meet the requirements of the ministry and must provide a good basis for the ministry's dialogue with the politicians."*	Seizing: project approval process, long-term planning
Example 7	*"When you develop something, you have to develop it in a new way after a while – such as 10 years. It's very important trying to make a development plan. You have to be able to make parts, modules of all these developments and try to make a development that moves the organization partly from year to year."*	Seizing: long-term planning

Open innovation mechanisms: expanding the actors portfolio and changing the purpose

Collaborating with other tax administrations, public actors, private organizations, and citizens helped Tax Norway in developing and innovating. Throughout the period considered, the case organization has adopted such mechanisms. Initially, it was primarily done to fine-tune the services offered, while nowadays it is more about indulging a new way of taxation that requires more cooperation among all the actors, referring to the so-called "ecosystem". These open innovation mechanisms consist of reference groups of the interested actors, contact forums, open discussion, surveys, and so like. Moreover, in the early 1990s, the collaboration with other tax administrations was more relevant than the one with the public sector, private sector, and citizens. Over time, the Norwegian Tax Administration understood the crucial contributions by the private companies, the taxpayers, and the other public agencies. Incorporating these actors in the development of the

organization resulted in an effective move considering that the service offered by the Tax authority addresses companies and citizens. This is particularly relevant nowadays where many of the benefits from information technology require cooperation between different sectors and the exchange of structured information.

In the latest years, cooperation with such actors has become an integral part of the development plan of Tax Norway. The evolution of taxation requires an integrated approach. NTA initially focused on modernizing its own structure, but lately, it has been more involved in spreading digitalization, thus adopting an ecosystem approach. For example, together with the finance sector, the NTA is running projects about creating digital solutions that support processes better. One of these projects, the "consent-based tax information", consists of taxpayers giving thirds parties - e.g., banks - access to selected parts of their tax information when they need to document their financial status, for example, when applying for a loan. Sharing information and data is becoming crucial for today's society, and that is the direction towards Tax Norway is going to. This integrated approach also involves partnerships with other actors of the public sector, such as the welfare agency and the statistic agency, contributing to developing the next level-ecosystem. However, this does not come easily: there is an increasing need to share information and data of high quality. This is an aspect that the NTA, together with the other actors, is currently focusing on.

	Citation	Label (what the quote is an illustration of)
Example 1	*"The tax administration worked in contact with the involved third parties, through for example reference groups and contact forums with businesses, employers, banks, public sector administrations and others involved."*	Seizing: collaboration with private sector and public sector
Example 2	*"We're doing much more collaboration with the private companies, or the private sector I would say, - because it's not necessarily single companies, but more like private organisations or interested organisations or industry and stuff like that. But also, we're trying to make sure that we are kind of compliant and trying to support other public sector institutions as well."*	Seizing: increased collaboration with private sector
Example 3	*"Many of the benefits from information technology require cooperation between different sectors and exchange of structured information. This is still a big challenge - even though we have had some successes. … Altinn [a common system for business reporting] was established in cooperation between the tax administration, Statistics Norway, and the Norwegian business register. This is also a very important reform which required the close cooperation between different administrations. This kind of close cooperation between different administrations on information technology is very important."*	Seizing: cooperation with private sector and public sector
Example 4	*"The thing that we have been doing in the past few years is looking not only at digitalization within our tax administration, but also having a more ecosystem-approach supporting processes and events that spam several organizations."*	Seizing: ecosystem-approach
Example 5	*"There is a lot of friction, because most government bodies are used to defining how I want information, especially designed for my purpose and when you're going to the joint information sources then you have to give up something. You also gain something, but you don't see that necessarily up front. But I think it has progressed overtime. It was more difficult during the planning years, while after we executed, I think, the friction is less. But the friction will always be there because we are inclined to have our special needs taking care of."*	Seizing: increased collaboration with other governmental bodies

Fostering learning and experimentation: the encapsulation of failures

Public actors are vested by public accountability and require the trust of ministries and the public to operate; therefore, failures are commonly not well welcomed. This is also true in the case of Tax Norway, although they understand the need to experiment and embracing failure to develop. To overcome this issue, the organization has smartly found ways over time to "hide" failures, thus fostering learning and experimentation. This is done by the "encapsulation of failures". The approval of projects by the ministry sets boundaries in terms of resources – manhours, money, time - that cannot be modified. However, this is not well suited for dealing with rapid technological shifts. Dividing the project into phases and smaller deliveries allows a higher flexibility in managing the pre-allocated resources. This

can also be seen as a real-option mechanism, in which sequential steps and continuous adaptation and learning allow to deliver successful investment decisions.

	Citation	Label (what the quote is an illustration of)
Example 1	*"The way we run this large project is that they are running from 4 to 9 years, so we commit upfront quite a lot of cash and resources and we have to succeed with the boundary or in total of the project. But we can have a lot of small failures within the project: that is encapsulation or failure. Because if you were able to divide your huge nine-year-project into, let's say, 4/5 phases, each consisting of about 16 deliveries, and you take smaller risks, where we actually fail quite often in governmental terms, but they are very small failures that lead to learning and then actually delivering faster or cheaper or with better accuracy or do you want it to deliver to the project as a whole. So, in many ways I would say that in order to be allowed to experiment and do innovation, we have to do it in secrecy."*	Seizing: encapsulation of failure
Example 2	*"I think that's part of the agile thinking. It's about handling risks, about delivering small pieces fast and early in the process, learning and adapting. Working agile helps us reduce risks and better understand the needs of the users, both external and internal."*	Seizing: agile way of working, fail and learn

5.2.3 Transforming

The most visible transforming capabilities that emerged from the Norwegian case are the renewals of the organizational structure. Alongside that, the adoption of a more agile way of working helps the organization develop transforming capabilities. The Norwegian Tax Administration experienced two main reorganizations in the time span considered, in 2007/2008 and in 2018. These were structural adaptations to the changes that the organization sensed and seized (Figure 6).

The first reorganization aimed at bringing more competence and responsibilities over development to the professionals and trying to rebalance the great influence played by the IT offices. They integrated the services into regional divisions, thus creating the need for competence development. This represented the very first big restructuring of Tax Norway and was necessary to concretely address the changes that started in the 1990s.

In between the two restructurings, in 2011/2012, the modernization of IT and way-of-working consisted in a key shift. It was the result of a project that highlighted the inappropriateness of the current systems to deal with the emerging needs - that were more

real-time responses and integrated services. After that, the organization started adopting more agile ways to think and work (e.g., DevOps teams and cross-sectional teams) and changed its mentality towards becoming keener to take risks.

The reorganization in 2018 slimmed Tax Norway even more by restructuring the organization into five divisions with responsibilities at a national level. The drivers were the need for faster responses, better handling of cases, increased cooperation, and a structure suited for the emerging digital and interconnected world. The new structure saw the emergence of the Information division and a new setting of the Innovation and Development division. The installation of the former highlighted the increasing relevance of information and data. Regarding the latter, to consolidate the approach to technological opportunities, the division was split into two: the Innovation division and the Development division. With the previous structure, the development happened only in the Development division, thus being completely detached from the rest of the organization. The changes aimed at facilitating the dialogue about innovation among all the units and at specializing the organization in detecting opportunities for development. Moving from having a silos structure - composed by local, regional and national levels - to having units with nationwide responsibilities (from almost 450 offices to 55 offices) allows Tax Norway to have fewer divisions with higher specialization, thus enabling faster development.

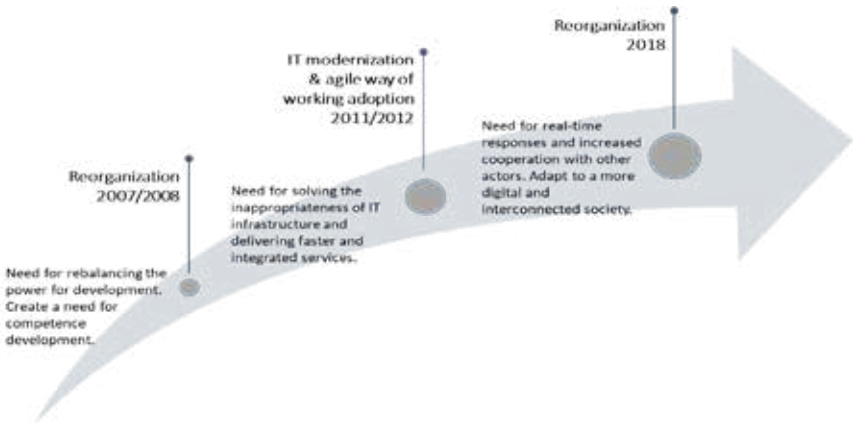

Figure 6: the main structural changes of Tax Norway over time

	Citation	Label (what the quote is an illustration of)
Example 1	*"It was more a strategy for competence building in the whole organization than a reorganization of the ICT. That was a consequence of it. So, the new organization started from the 1st of January 2008 and we put some very good people from the ICT Department in the "Department of Innovation and Development", we called it. It was a very brave and ambitious thing to do, and we should have payback for doing so. I think that we really professionalized the running of the projects and development in Tax Norway by doing so: putting so much power, strength, and capability into the Innovation and Development Department and they were in charge of all these projects running in the whole organization."*	Transforming: restructure of 2007/2008
Example 2	*"The reorganization of the Tax Administration launched on 1 January 2008 is the agency's biggest reorganization ever. The organizational solution is future-oriented and opens up new opportunities, but is demanding to realize. It will take time before all desired effects can be realized, although we have made important progress in 2008. Upon the reorganization, we chose to move tasks in front of employees. That meant that over half of employees received in full or in part new tasks. This created a need for competence development."*	Transforming: restructure of 2007/2008
Example 3	*"Much of this has to do with innovative technology, but also on how we work. We used to work in a way I would describe as a "waterfall method": where you first had long discussions; on different arenas discussed what are we going to make and writing all the requirements in detail and then making estimations in IT - what will it cost to produce this code and then make it and then test it. But today, we are working together, in cross-dimensional teams, or cross-functional teams, where we actually have people from the law side working together with the business analysts, working together with IT developers and IT testers, and making step by step incremental solutions. So, that is one of the reasons why we have managed to speed up, because we have divided all the various problems into smaller subgroups and then have cross-functional teams working together."*	Transforming: IT modernization and agile way-of-working adoption of 2011/2012
Example 4	*"But what I see now, in hindsight, is that one of the main reasons why Tax Norway is perceived to be a very modern government institution with the technology, this far ahead from other organizations, is that in 2011 we took a huge risk. We, consciously, selected patterns of technology that were in the absolute forefront. We were ourselves quite convinced that this was the correct choice to make, but we have seen that many other tax organizations have declined, then not chosen this route. They have instead chosen a very other means of doing taxation. The analytics company Gartner, they said that we were incredibly courageous in 2011 by doing this, because there was a very huge risk involved."*	Transforming: IT modernization and agile way-of-working adoption of 2011/2012
Example 5	*"It was a total reorganisation of the whole NTA [referring to reorganization of 2018], so the whole tax administration was reorganised from having a regional structure, where we had the five regions and one corporate centred unit, into more service designed on the organisation. Because we were developing into a more and more digital way, most services that we have are delivered digitally. So, we don't actually have to have a physical presence as we used to do earlier."*	Transforming: restructure of 2018

Example 6	*"The information division was created in 2019. There was a big reorganisation of the whole tax administration. So, I was project manager for the organisation project that convinced the rest of the organisation to establish the Information Management division. It was a strategic decision. It's pretty obvious now, but it wasn't in 2017/2018 when we prepared it. I think that now we are more interested in information than in technology, because technology is the enabler, but the information really is the key to drive through digitalization."*	Transforming: restructure of 2018, Information Department
Example 7	*"We had a reorganisation roughly two years ago and then the business development and innovation used to be the same unit, but it was split into two. So, I used to be a broader focus business development unit, but now it's a purely innovation. That split means that we divided the early stages of development - which would be idea development, the more strategic thinking and those elements - into the Innovation Unit, which I am a part of, from the actual development project that supports and that is more in the Business Development Department. So that's the organisational setup."*	Transforming: restructure of 2018, Development Department
Example 8	*"I think it was harder to implement changes in the old organisation, because there were so many levels, there were three levels in the structure: you have the national level, regional level and the local level. Every level was doing a little bit of everything. But now you have national divisions. With specialization, reduced levels and larger organisational bodies, it's easier to implement changes fast."*	Transforming: organizational renewal

5.3 Enablers and obstructors over time

Conducting the research with a time perspective allows highlighting what inhibits and encourages the evolution of dynamic capabilities, thus affecting how the organization deals with technological uncertainty. From the data, some key elements emerged, but with a different impact and relevance over time. Some refer to internal elements of the organization, particularly the role of the IT Department and the leadership. Some others are external, such as the impact of the law, the relationships with other actors – the ministry, politicians, the public, the private sector, and the public sector – and the stimuli from the society. Furthermore, one element that clearly emerged from the data is the effect of a history of successful performance and the legacy. The main enablers and obstructors are summarized in the figure below (Figure 7).

Figure 7: Enablers and obstructors

Contextual factors, such as the society's mentality and culture, have an influence over Tax Norway's way of approaching technological development. Changes in society also result in different inputs towards the Norwegian Tax Administration. The increased level of trust and confidence towards the organization and the fast changes in the needs stimulate Tax Norway to address development issues. On the other hand, the great relevance given to privacy inhibits the possibility to fully exploit modern technologies, such as Artificial Intelligence. This aspect is strictly related to another element: the law and, more specifically, the time for changing the law. The regulatory environment is even more relevant nowadays that technological changes happen faster. The difference in speed inhibits technological development and severely slows down the evolution of dynamic capabilities.

Over time, Tax Norway has collected several successes, thus resulting in increased confidence by external actors, such as the ministry, politicians, and the public. The excellent reputation and legacy developed throughout time have allowed the organization to get the necessary support for running ambitious projects. Discussing confidence is even more relevant in the public sector, in which the approval by the ministry and politicians is necessary to operate. Projects and pilots are the means used to foster development. However, they are subject to the approval of the political side. Recently, this relationship has represented a critical obstacle to technological development: given the satisfying situation, politicians do not see the need for finding new income, thus obstructing the implementation of AI-related processes. Moreover, the constrained resources given to development strongly obstruct the capability of the organization to nurture dynamic capabilities properly.

Lastly, it clearly emerged from the data the importance of leadership as an enabler to develop such capabilities. It was particularly relevant in the past when Tax Norway needed a radical turnaround in mentality to start dealing with technological development.

Figure 8 represents the relevance overtime of the main enablers and obstructors highlighted in this case. Please note that the enablers are represented with the green upward arrow, while the obstructors with the orange downward arrow. The level of filling of the arrow stands for the relevance of the factor: for example, the slowness of law is more relevant today rather than in the past.

Figure 8: Enablers' and obstructors' relevance over time

The following subsections give more details about the enablers and obstructors, together with underpinned quotes.

Contextual factors: culture, trust and needs

The context in which an organization is inserted certainly affects its way of operating, hence shaping the approach to development and innovation. Norwegian citizens show high trust toward the government and are also quite tech-savvy, thus enabling the NTA to pursue development. On the other side, privacy is highly valued, and it results in limitations to use and work on personal information. This last aspect emerges particularly concerning todays' innovative tools: artificial intelligence and machine learning.

Moreover, the changes in society and the related changes in the needs of the citizens set new expectations towards the tax authority. Phenomena like globalization and digitalization brought more complexity into society. For example, in todays' society, Tax Norway needs to respond to the need for more integrated services, real-time responses, and shared information. A new way of doing taxation is evolving, and the NTA wants to be at the forefront of this change.

	Citation	**Label (what the quote is an illustration of)**
Example 1	*"I think also that which kind of systems you are implementing is affected by the different types of societies: whether you have a lot of corruption, for instance, you can't just adopt the Norwegian model or where there is no trust between the government bodies and the public, adopting the Norwegian model is not the right one for you, because you need more control and harder mechanisms that we are using. We are mostly doing what the bank is doing and giving you a website where you can do most things yourself. And in most cases, you are doing it right. That is why we have developed more into a service organisation than a government body controlling you. So, striking the balance there and that balance needs to be different in different countries."*	Contextual factors: societal characteristics
Example 2	*"That is because in Norway, privacy is valued very high. If you compare, for instance Russia, that would be a laughable matter: of course, the State should be allowed to use every form of information they know about you and even do intelligence work on you, as a persona, in order to stop you from doing tax fraud. But in Norway that's certainly not allowable."*	Contextual factors: culture, privacy
Example 3	*"The main challenge now is that development issues are much more complex than they used to be. Because of development in the past - the digitalization - we have taken small, separated parts of processes within the organisation and then taken them from paper forms to computers. So, you had a lot of fairly separated problems. Now everything is within the ecosystem and linked and so it's a much more complex environment. What we are doing is affecting other government bodies and the public in another way than it used to be… and our role is changing! I think that the public is expecting more and more personally adapted services: you don't want to go onto five different systems and log on to five different websites to fulfil a task, so we have to link our services and link services with other government bodies as well."*	Contextual factors: digitalization and globalization
Example 4	*"Because the point is not that the tax administration exists, but that taxes are paid, or that the Norwegian state is financed, basically. That's a huge shift, because previously if everything had to come to us, then we would have to ensure mechanisms that would function well, but now, if we say that taxation should just happen, with as little friction and reporting and hassle and everything as possible, then we will need to put our business logic, or the tax rules, out into the society and then we would need help from other actors as well - those can be public or private."*	Contextual factors: changing the way taxation is done and perceived

Speed of law

This element finds connections with the importance of privacy presented above. The way of using the data and for what reasons is explicitly provided by the law. The law, and more precisely, the speed of changing the law, negatively affects the capability of Tax Norway to develop. This is particularly relevant in today's society, in which technological shifts happen frequently. Even if the organization finds innovative ways that ensure higher quality and faster processes, they will not be put in place until the law updates accordingly. The problem would not exist if the laws were rapidly adapted, but unfortunately, this is not the case; indeed, implementing legal changes requires several years. For example, AI tools would enable Tax Norway to speed up handling cases and detecting tax evasion, but outdated laws obstruct its application.

	Citation	**Label (what the quote is an illustration of)**
Example 1	*"Another thing I wanted to mention was the way the laws are written in Norway. A law is written stating explicitly why you are collecting data and what can you be using the data - for the information. If you later find, through e-learning or innovative use of technology, that you could actually use the data or information in completely other means - to gain new insights into the information or make new services - then this is explicitly forbidden. In order to make new services available, or use the information in a new matter, we have to change the laws. And this is a very slow process… changing one word alone usually takes from 18 to 24 months, so that's quite hard. This limits the innovation factor severely within the government sector."*	Slowness of law limiting innovation
Example 2	*"I think that what we've seen was that the linkage between digitalization and regulation is much more important now than a few years ago. Not only regulations, but also standards. I mean, we can also help regulate the market, or create tax compliance by introducing standards and rules, creating self-regulating mechanisms in the society. I think that digitalization is giving a lot more opportunity to do that."*	Link between digitalization and regulation

History of successes and legacy

Tax Norway, success after success, has experienced an increased self-confidence. The organization has always shown the will to strive for being the best. The history of the success of Tax Norway started in the 1990s, marked by solid and forward-thinking leadership and triumphant projects. The legacy set by the general director of that time and the one after him strongly affected the culture and way of working that the organization had

the following years. The image of a successful and effective organization that the NTA established over time has benefited the relationships with the ministry, politicians, trade unions, and the public. Hence, these actors developed increased confidence in the tax authority's actions but at the same time increased expectations from it. However, having this reputation can also represent an obstacle to innovation because a successful path can be hard to deviate from. It is hard for an organization to revolutionize the way of working that has proven to be successful, and this can hinder organizational agility, thus limiting the capability to tackle technological development effectively. Nevertheless, Tax Norway seems to benefit from the legacy rather than being harmed by it.

	Citation	**Label (what the quote is an illustration of)**
Example 1	*"I think Tax Norway had some of the first so called successful IT projects in the public sector and implemented the changes that were perceived by the public as real progress, as good service. I think, then new leaders also want to continue that success story, they don't want to be the first leaders to be unsuccessful in that sense. So, it creates expectations and then the organisation is also driven to fulfil the next expectations to uphold the role that we have."*	History of successes, legacy, increased expectations
Example 2	*"But I think that one of our strengths is that we've been able to deliver digitisation projects. We have had very few setbacks in the last 15 years. Most of our projects have been realized as planned and most of them have given use benefits that we have aimed for as well. We've been able to deliver value continuously through our large projects."*	History of successes

Agent-owner relationship: the political aspect

The public sector is characterized by complex ownership. The actions of the Tax Authority are dependent on the approval by the ministry of finance and need to pass through the scrutiny of politicians and the labour unions – particularly for projects that entail consequences on the personnel. The word *tillit*, "confidence" in Norwegian, was mentioned by all the informants when discussing the relationship with the ministry of finance. In the 1990s, the strong support by the ministry was crucial for the technological development of the organization. Its increased confidence enabled Tax Norway to pursue ambitious projects over time. However, the relationship with politicians often represents an obstacle for the technological development of Tax Norway. Politicians are willing to give support to projects that satisfy the needs of the public. Therefore, the organization must provide facts and data

to ensure resources for funding the projects. Currently, the organization is struggling to get support for innovative projects related to artificial intelligence and machine learning. Politicians do not feel the need to support such projects because, as emerged from the data, there is no need for new ways of getting income and do not believe it is an impelling necessity. This also finds an explanation in the safe status in which Norway finds itself at the moment. It is believed that when there is a crisis, then the need for innovative ways of securing income will be relevant, thus getting the support of politicians.

	Citation	Label (what the quote is an illustration of)
Example 1	*"I knew that the Department leadership in the ministry of finance, they were very different from what we used to have in Tax Norway. When you ask why we are successful it is also because we had high priority in the ministry of finance, that's because we had all the money running through the system of course - that's a very good argument for everything – and after a while we got very high confidence in the ministry. They believed in us and they said we could have run projects, but we had to keep them updated all the time. That was a very important thing."*	Relationship with the ministry of finance, confidence
Example 2	*"The good and open relation between the ministry and the tax administration has been very important here. The ministry has been wise in saying "okay, since you are to realise the changes, we need you to propose how to do it". The ministry however had feedback on them. So, the proposals for changes came from the tax administration, and I think this has been very important. It was also very important that the ministry has an active attitude also towards contentiously following the change process, through status reports and high-level meetings every quarter or so. It was important that the ministry had a good understanding of status and risks, and how to cope with it."*	Relationship with the ministry of finance, support, confidence
Example 3	*"These interviews [interviews to taxpayers conducted annually by Tax Norway] in general indicate good results and positive development: the public in Norway has a much more positive attitude to the Tax Administration than they had 20 years ago. I think that almost 80% of the population has high confidence in the Tax Administration … Politicians are more willing to invest when they see we're positive response from the public on development efforts."*	Relationship with politicians, support by the public
Example 4	*"We need acceptance among the politicians, that's something we would like to change. If you look at, for instance, France they had, as I mentioned earlier, the need for new income. So, what the IT department in France suggests was that "we could use aerial footage, we could use drones and aeroplanes to fly over the country, taking pictures and we could use artificial intelligence to find swimming pools, garages, subletting rooms or houses". And what they actually did in France was that they made a law that said "if the tax government finds sufficient evidence that you're probably having a swimming pool, then it's your responsibility to document that you actually do not have a swimming pool, otherwise you have to pay taxes for the swimming pool - that now has been sufficiently documented". And 'sufficiently' here is a black magic box which has stated, based on aerial footage, "we are 97% sure that you own a swimming pool. Pay taxes please". In Norway, there's no such acceptance. So, even though we have found quite a high number of ways to do other forms of income taxes - whether it be on property or cars or other valuable objects - there is not an acceptance in the political functions to actually allow this."*	Relationship with politicians: support by politicians to innovative projects constrained by no need for new income

Leadership

From the data emerged the importance of the leadership for the development of Tax Norway. The initiative and decisive positions of top-level personnel in supporting innovative projects and radical change in the way of working have represented a crucial enabler for the case organization. The importance of having forward-thinking people, especially at the top and middle level, stimulate innovation and contribute to helping the organization handle technological uncertainties.

	Citation	**Label (what the quote is an illustration of)**
Example 1	*"I think the strength is that we have a top leadership that is daring to think new radical thoughts. It doesn't mean that they always land on them because the main responsibility is the daily operations, obviously, but they encourage the discussion and that discussion increases the maturity within the organisation, which overtime then gives us a more curious-in-development-friendly culture."*	Forward-thinking top-level leadership that encourages discussion and innovation-oriented culture
Example 2	*"And what I've learned by working for four different director generals, is that top level management and the leader, him or herself, is actually quite important, because they decide what kind of risk they are willing to take. When Svein Kristensen decided, together with the finance ministry, that he wanted to take this risk, it was worth the risk, that put us on a path that really the next director general could not deviate from. He was committed, he inherited the commitments - he had to make new IT systems, he had to complete all the projects that were started by Svein Kristensen."*	Top-level leadership willing to take risk

Allocation of resources

The allocation of resources is dependent on the approval of the government. The only way to secure funds for projects is to provide extensive information initially, displaying the way of implementation and the risks entailed. Once the plan is set and the budget is allocated, it cannot be modified. This represents an excellent obstacle for projects that deal with technological development due to the fast pace with which changes happen. Moreover, the public sector often struggles with limited resources and budget cuts, and, on top of that, there are no allocated resources for innovation, experimentation, and exploration. Public actors are primarily expected to perform day-to-day operations well, whereas the development aspect is considered secondary. Then it comes with no surprise the absence of pre-allocated resources for daily development.

	Citation	Label (what the quote is an illustration of)
Example 1	*"And, as I said, one of the reasons is that we don't have any budgets, money or resources, to actually work targeted on innovation. We have no research and development sections or divisions. Usually, if you go to the private sector, you always have an R&D division in addition to the production part, and we do not."*	Budget constraint: no budget allocated for innovation
Example 2	*"Because in this organization, as many others, they are in need of more money to do the daily work. They fight between daily operations and development is steady."*	Budget constraint: daily operations versus development
Example 3	*"This is also one of the challenges within the government sector because there is really just one way of securing finances. That is by proposing a new concept in this way: we're delivering various descriptions of concepts that we could make, and then we recommend one of the concepts, and for this we have done an in-depth and detailed analysis on how to proceed and how to make it. This way of financing large changes in the public sector was originally made for the transport sector - how to build roads, how to build bridges - where you needed to do upfront quite a lot of risk assessments in order to not, while building half of the bridge, discovering "oh, we didn't think about that. We are supposed to use railways as well, not just personal vehicles". But this doesn't suit the IT sector, because, as you say, the changes are so rapid, the pace is so fast that you are not able to do this."*	The way to secure finances in the public sector collides with fast technological shifts

6. Discussion

This section summarizes the findings and compares them with the theory, thus highlighting the contribution to the literature.

As presented in the Literature review chapter, dynamic capabilities are often represented by sensing, seizing, and transforming capabilities, each with elements supporting them (Refer to Table 2; Schoemaker *et al.*, 2018; Teece *et al.*, 1997). As emerged from the analysis of the findings, the empirical data are coherent with the theory. However, some new meanings have emerged. This was expected due to the different context which this research focuses on, that is, the public sector and the different approach adopted, that is, a time perspective. Indeed, this research contributes to the literature on dynamic capabilities in the public sector.

It is often perceived that development and innovation deserve residual considerations in the public context, but this case shows how public actors must deal with it. Due to the natural characteristics of governmental bodies and their expectations, they need to find alternative ways to pursue and embrace development effectively.

Compared to the private sector, the public sector finds more obstacles in experimenting and exploring new territories due to constrained resources, high accountability, and strict political relationships. In this context, public actors need to find ways to address technological uncertainties. The adoption of sequential real option mechanisms has been found particularly relevant in the public sector, both when it comes to sense the environment (sensing) and effectively tackle the technological opportunities (seizing), thus allowing the organization to adopt a prudent approach (McGrath & McMillan, 2000; Ipsmiller *et al.*, 2019). The pilots and projects that Tax Norway carries out can be seen as "scouting real options", to discover new opportunities and as "stepping-stone real options" to develop and follow paths in a sequential way (McGrath & McMillan, 2000).

Furthermore, by sectioning projects in parts with smaller deliveries, the organization can encapsulate failure and consequently experiment, learn and adapt within the boundaries set by the pre-approved outline by the ministry. Embracing failures and fast learning are essential elements that support the development of dynamic capabilities (Teece *et al.*, 2016). This easily applies to the private sector, whereas public actors are expected to perform safely

and to show stability. This study highlights how experimentation, which is crucial for technological development, has to be done under the radar in the public context.

Experimenting under the radar and encapsulating failures are strategies put in place by public bodies to address innovation, also given the limited resources allocated for development. The literature about dynamic capabilities reports the importance of building slack of resources and adopting flexible resource arrangements when pursuing investments with uncertain outcomes (Teece *et al.*, 2016). This is undoubtedly easier for private actors with higher freedom of choice and that often allocate specific resources for experimenting and innovating (for example, in Research & Development divisions). On the other hand, public actors find themselves limited in actions that go beyond the operational and daily tasks: they need the approval of the political side, which is often subordinated by the public's support rather than by objective positive outcomes, and typically there are not resources exclusively allocated for experimenting and innovating. This aspect also highlights the excellent relevance for public bodies of having good relationships with the political side, which are often developed over time.

One element that this study highlights in accordance with the literature on dynamic capabilities taken as reference (Teece *et al.*, 2016; Schoemaker *et al.*, 2018) is the great importance of collaboration and cooperation with other actors. Open innovation mechanisms represent an indispensable tool for public actors to develop strong dynamic capabilities (Teece, 2020; Chesbrough, Vanhaverbeke, and West 2006). As stated in a recent paper by Teece (2020, p.24), "an open innovation orientation enriches a company's knowledge base and hence its ability to sense and make sense of changes and trends. It highlights the potential for out-licensing as a prominent component of the bundle of potential business models for seizing. Furthermore, it reinforces the more general openness that underpins the willingness to change required for ongoing transformation". Public actors address the needs of the society as a whole, in which different actors have different needs, and act towards creating public value. Engaging in discussions with other public bodies, international agencies, the private sector, and citizens allows the organization to learn, get new insights, and develop. This aspect is particularly relevant in today's society, where the public requires integrated and customized services.

This study further informs the literature by providing an analysis of the dynamic capabilities under a time perspective and discovering what inhibits and what enforces the development of dynamic capabilities to face technological uncertainty. As extensively presented in the Findings chapter, it highlights how the public organization develops sensing, seizing, and transforming capabilities and how they evolve over time. Furthermore, this study stresses the importance of considering the concept of path dependency when discussing dynamic capabilities.

The development of sensing, seizing, and transforming capabilities results from an internal buildout; therefore, it is affected by the characteristics, actions, and history of the organization. History matters in the public context too, and one can argue that it is even more relevant when compared to the private context: the need for having the support necessary to operate - from the public, from the political side - makes reputational aspects crucial for public actors. This study highlights how "path dependency", which is often related to lock-ins, can instead lead to positive development, thus talking about positive "path creation" (Garud, Kumaraswamy, and Karnøe, 2010). Legacy and culture are built and strengthened over time and affect how organizations operate, thus also playing a role in the future development of the organization and its capabilities. The Norwegian case highlights how a successful history and a reliable reputation represent essential aspects for a public actor to dare to innovate. However, organizations with successful histories could also find themselves reluctant to change a way of doing that has proven working well so far. This is an interesting and delicate trade-off that organizations might face when addressing the topic of development and innovation.

Sensing, seizing, and transforming capabilities are strongly interrelated: the opportunities sensed need to be seized, and the organization then needs to transform accordingly to take advantage of them effectively. For example, exploratory capabilities initially relied mainly on top-level management intuitions, while later saw middle-level management as the true bearer for development. This was possible thanks to a legacy and culture towards development developed over time and thanks to a restructuring of the organization, which gave the Departments higher responsibility and flexibility and brought a more agile way of working and thinking.

This study highlights how the organization increases the stock of such capabilities and refines them over time by considering elements that act as enablers or obstructors (refer to Chapter 5.3 *Enablers and obstructors over time*). Resource constraint, the complex political relationship, and the regulatory environment's slowness are elements that obstruct the development of dynamic capabilities. However, it is possible to spot a different relevance in time. For example, the slowness of changing the law is crucial today in which technological changes happen at unprecedented speed. This highlights the need to have a more significant and simultaneous discussion between the legal department and the IT department to develop the law and the systems in parallel rather than sequentially. This confirms, even more, the need for public organizations to have dynamic capabilities and the relevance of having good relationships with the Parliament and the political actors. By looking at the enhancing elements, the great history of successes and legacy led to the organization gaining more confidence from external actors and self-esteem, thus representing today as a great enabler towards technological development.

The following table summarizes the sensing, seizing and transforming elements emerged from the data: the second column presents the data without a specification of time, to make comparisons with the theory (refer to Table 2); the third and fourth column reclaim the changes in the capabilities presented in Figure 4.

Dynamic capabilities	Summary without time consideration	Summary with time consideration	
		Before	*After*
SENSING	● Leadership intuition and forward-thinking ● Open innovation mechanisms and cooperation (other tax administrations, international bodies, private sector, citizens) ● Real option plays and scenario planning ● Sensing inappropriateness ● Attempt to enhance knowledge inside the organization (cross-sectional teams, leadership of development of professionals)	● Top-level management intuition ● Discussion with other tax administrations	● Mid-level management input ● Discussion with other tax administrations, private sector, public sector, taxpayers ● Structure for exploring: real options mechanisms, enhancing diffused knowledge
SEIZING	● Exploratory investments, real options through projects and pilots ● Open innovation process (other tax administrations, international bodies, private sector, citizens) ● Encapsulating failures, fostering learning and experimentation	● Projects and pilots ▪ Strong IT Dpt; ▪ mainly with other tax administrations and public sector ● Open Innovation (fine-tuning)	● Projects and pilots ▪ DevOps and cross-organisational teams ▪ With other tax administrations, public sector, private sector, taxpayers ▪ Development planning ● Open innovation ("ecosystem" approach) ● "Experiment" by encapsulating failures
TRANSFORMING	● Organizational renewal ● Agile working (DevOps, cross-sectional teams)	● Organizational renewal	● Organizational renewal ● Agile way of working

Table 6: Summary of sensing, seizing and transforming capabilities in the Tax Authority

7. Conclusion

This conclusive chapter provides a summary of the findings and answers the research questions. Moreover, this section presents the managerial implications, the limitations of the study, and suggestions for future research.

Technological uncertainty affects the public sector, thus forcing it to evolve and keep pace with technological innovations. This study aims to understand how the public sector deals with technological uncertainty by developing and changing dynamic capabilities over time. The questions that it wants to answer are, in fact, "How do public firms develop dynamic capabilities over time in situations with high technological uncertainty?" and "What are the factors inhibiting and facilitating the development of these capabilities over time?".

Public actors develop dynamic capabilities to face the great uncertainty brought by the fast speed of technology. The stock of sensing, seizing, and transforming capabilities increases, changes and strengthens over time. Sensing capabilities initially rely more on top-level intuition and discussion with other tax administrations, eventually diffusing more into the organization (inputs from mid-level management and enhanced knowledge mechanisms) and enlarging the network for cooperation to the private sector, other public bodies, and the public. Seizing capabilities develop through increased flexibility regarding projects and pilots, and cooperation with other actors (other tax administrations, public sector, private sector, public). Transforming capabilities result in a greater agile way of working and organizational renewals. By adopting a time perspective, we can also argue that the development of dynamic capabilities, and the related ability to deal with technological uncertainty, is affected by internal and external elements, whose incidence changes over time.

The difficulty in mapping the dynamic capabilities over time and the focus on the Norwegian context represent the main limitations of this study. Future research could further investigate the evolution of dynamic capabilities in different contexts to highlight differences and similarities with the empirical findings that emerged from this research. Further quantitative or qualitative research on this topic would help to refine the findings and ensuring higher generalizability. Future research could also closely follow an organization over time – i.e.,

longitudinal studies - thus providing a close look at the development of its dynamic capabilities.

This study provides insights into managerial implications in the public sector. Dynamic capabilities are getting more relevance in the public sector, although it still results less addressed than the private sector. This study highlights the importance of people, internal processes, and cooperation with other actors within the public organization to enhance organizational agility when facing technological uncertainty and the relevance of taking into account the time element. Indeed, considering the time aspect is crucial in a sector characterized by an intrinsic and necessary relationship with the political side, which is strongly dependent on mandates and public support. Planning, adopting sequential mechanisms to investments, and ensuring flexibility are crucial elements for public actors to face technological uncertainty.

A significant change is happening in the taxation panorama driven by technology and increased interconnectedness (OECD, 2020). Tax authorities are increasingly adopting multiple roles, both as a government body and business partner. I firmly believe that we will witness other relevant shifts in the organizational structure in the upcoming years, and the dynamic capabilities that the organization has built so far should allow the NTA to address these changes successfully.

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Appendix

Appendix A – Consent form

Informed consent form –Participation in RaCE research program

NHH Norwegian School of Economics

Background and aim
This research is a part of the RaCE project at SNF and NHH Norwegian School of Economics. The goal is to examine how established firms respond to and manage radical technology-driven change. We are targeting individuals within established firms that have information on and experience with organizational changes.

What participation in the study entails
We invite you to participate in an interview lasting 1 hour(s). If you permit, the interview will be recorded and later transcribed. The audio file will be deleted after transcription and the transcribed version will be anonymized.

How is information about you handled?
Personal information will be treated confidentially. Any information that could identify individuals will be removed (eg your name). Transcriptions will be allocated a code instead. Name and contact information, including this form, will be kept separate from any interview data. Only persons participating in the RaCE project at NHH/SNF will have access to the anonymized interviews.

Your organization will be anonymized.

Voluntary participation
Participating in the project is voluntary. You can withdraw at any time without any further explanation. If you choose to withdraw, all information about you and your interview will be deleted.

Should you have questions regarding the research project, please contact:
Claudia Zamarian: mobile phone +393313185627 or email: claudia.zamarian@student.nhh.no or Christine B. Meyer: email: Christine.B.Meyer@nhh.no
Should you have other questions please contact: personvernombud@nhh.no

On behalf of SNF/NHH, the Norwegian NSD has approved the procedures followed by the RaCE research project are in accordance with current rules and regulations for handling data.

Your rights
As long as you can be identified in the data material, you have the right to:
- Access in which personal information is registered in your name
- To correct personal information about you
- To have personal information about you deleted

- To receive a copy of your personal information (data portability)
- To file a complaint to personvernombudet or Datatilsynet regarding use of personal information on you

What gives us the right to use personal information about you?
By signing this form you consent to participate in the study.
Informed consent form:

I have received written information and I am willing to participate in this study.

Signature …….. Date…….

Printed name……..

Appendix B – Interview guide

This is the first draft of the interview guide, which has been fine-tuned throughout the interview process. The questions are initially informed by the literature and later enriched by subsequent interviews, thus allowing comparison among the emerging topics.

- What is your role at Tax Norway? For how long have you had that role?
- What is your background?
- When did Tax Norway start becoming so technological achieved?
- What happened a long time ago which put Tax Norway into the position it is now. What did it sense that time?
- How was Tax Norway before that time, what were the opportunities that enabled it to go there?
- How did Tax Norway change the organization?
- Why were they adapting to this technology very early and how was this given them the position in which they are now?
- How do they develop these types of technological capabilities? How did they sustain and further develop them?
- Did Tax Norway have inspiration from other agencies or was coming from themselves? Does Tax Norway perceive themselves as being in the frontline compared to other tax authorities and in Norway?
- Flexibility vs efficiency: how did and does tax Norway head this trade-off?
- What are the main technological innovations that Tax Norway adopted? Why and how did Tax Norway adapt to them?
- According to you, why did this happen in Tax Norway and not in other public agencies? Why is it very advanced also compared to international agencies?

- According to you, what opportunities does Tax Norway have now? What are the challenges of the future?
- Do you want to say something more? Is there anything I should know more about this topic?

The public actors are not exempt by the technological uncertainty, which increasingly affects both the private and public sector. Public organizations, and private actors, handle such uncertainty by deploying dynamic capabilities, which are defined as the ability of an organization to adapt to change (Teece *et al.*, 1997; Schoemaker *et al.*, 2018). This study wants to investigate how public organizations deal with technological uncertainty through dynamic capabilities. In particular, it highlights the effect of time on the development of sensing, seizing, and transforming capabilities and what are the elements that inhibit and enhance technological development.

This thesis consists of an exploratory study, adopting a case study strategy, and investigates how public organizations deal with technological uncertainty over time. The Norwegian Tax Administration is the case company participating in this research. First, a review of the literature on dynamic capabilities and technological development has been performed to gain more knowledge on the topic. Subsequently, primary qualitative data have been collected through semi-structured interviews and secondary qualitative data through the company's reports that were later analysed with coding techniques. The research consisted of an iterative process in which the information gained through the data collection served to refine the research question further. Although the literature has been utilized as the theoretical basis for carrying out the analysis, the findings reported new insights to dynamic capabilities theory.

The empirical findings report that sensing, seizing, and transforming capabilities change over time. The organization increases and strengthens the stock of dynamic capabilities over time, and it is possible to individuate elements that inhibit and enhance the development of dynamic capabilities, thus affecting the organization's ability to deal with technological uncertainty.

This thesis enriches the literature on dynamic capabilities and the public sector by investigating the topic adopting a time perspective. Moreover, this study is particularly relevant for managers of public agencies and officers of governmental bodies because it highlights the relevance of people and processes, as well as the great importance of contextual elements that affect the ability of a public organization to deal with technological uncertainty over time.

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