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Organizational inertia in a digital transformation project

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TIIVISTELMÄ:

Digitaalinen transformaatio on uusi keskeinen taito nykypäivän yrityksille. Toimintaympäristö muuttuu nopeasti teknologioiden vauhdittamana ja organisaatioiden on uudistuttava digitaalisesti pysyäkseen kilpailukykyisinä. Digitaalinen transformaatio käsittää uusien teknologioiden hyödyntämisen lisäksi myös merkittäviä muutoksia organisaation toimintamalleihin, prosesseihin ja kyvykkyyksiin. Organisaation tunnistamassa tarpeen muutokselle, muutoksen vauhti ja intensiteetti vaikuttavat merkittävästi siihen kuinka organisaatio ja sen työntekijät reagoivat muutokseen. Tämä on kriittinen risteyskohta missä organisatorista inertiaa, tai kitkaa, esiintyy ja joka toimii muutosta hidastavana tai estävänä voimana. Arvioiden mukaan 70% epäonnistuneista digitaalisista transformatiohankkeista epäonnistuu organisatorisen inertian takia. Organisaation dynaamisilla kyvykkyyksillä ja strategisella ketteryydellä on todettu olevan merkittävä vaikutus sen kykyyn ennakoita ja kontrolloida muutosta.

Tämän tutkimuksen tarkoituksena on ymmärtää kuinka organisatorinen kitka vaikuttaa digitaaliseen transformatioprojektin toteutukseen ja sen lopputuloksiin. Tätä kysymystä tutkitaan empiirisen tapaustutkimuksen kautta, joka perustuu globaalia teknologian käyttöönottoa edeltävään pilotti-projektiin. Tutkimukseen valitut eri teoriat sekä niiden tunnetut vaikutukset digitaaliseen transformatioon havainnollistettiin teoreettisella viitekehyksellä, jonka avulla muodostettiin pohja tutkimuskysymyksille. Tutkimus toteutettiin kvalitatiivisin menetelmin monimutkaisten teorioiden ja niiden ilmentymisen tutkimiseksi käytännössä. Tutkimus toteutettiin puolistrukturoitujen haastattelujen muodossa, joiden kohteena oli kahdeksan käyttöönottoprojektiin osallistunutta työntekijää esimerkkiorganisaation eri tasoilta. Haastattelut ajoitettiin pian käyttöönottoprojektin päätyttyä, jotta osallistujien kokemukset pystyttiin keräämään ja dokumentoimaan mahdollisimman tuoreeltaan. Haastattelujen tulokset analysoitiin tunnistamalla toistuvuuksia ja kaavamaisuuksia sekä yhdistelemällä useita eri teorioita.

Tutkimuksessa tunnistettiin taloudellisen, rakenteellisen, sosio-tekniikan, kulttuurillisen sekä kognitiivisen inertian muotojen esiintyminen käyttöönottoprojektissa. Tulokset vahvistavat ja todistavat aiemman kirjallisuuden ja tutkimusten tuloksia inertioiden syntymiseen vaikuttavista tekijöistä että niiden negatiivisesta ja rajoittavasta vaikutuksesta digitaalisessa transformaatiossa. Tulokset osoittavat inertioiden vuorovaikutuksen ja toisiansa vahvistavan suhteen. Tutkimus osoittaa erityisesti kuinka kulttuurillisen inertian alun perin rajoittava vaikutus käyttöönottoprojektiin muuttui mahdollistavaksi tekijäksi paradoksisen kaksoisvaikutuksen kautta. Tutkimuksen tulokset kasvattavat teoreettista tutkimustietoa todistamalla inertioiden välisiä suhteita ja vuorovaikutuksia.

KEYWORDS: Digital transformation, organizational inertia, dynamic capabilities, strategic agility

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ABSTRACT:

Digital transformation is a new strategic imperative for organizations to master in order to stay relevant and competitive in the rapidly changing operating environment. Digital transformation is not merely a technology implementation project, but a considerable transformation for the underlining business processes, business models and organizational elements. When organization is faced with a change, the pace and intensity of the transformation greatly affects how organization and its members react to that change. This is an inflexion point where organizational inertia typically occurs and acts as a hindering force, or when pushed, a cause for resisting force towards transformation. Organizational inertia is estimated to cause 70% of digital transformation projects to fail. Organizational abilities, such as dynamic capabilities and strategic agility plays a significant role in controlling and anticipating these challenges.

To illustrate the interplay and effects of organizational inertia, dynamic capabilities and strategic agility to digital transformation outcomes, this study introduces a theoretical framework. The framework further visualizes the enabling effects of dynamic capabilities and strategic agility to a digital transformation project. This illustration visualizes the research setting for the research questions. The purpose of this study is to understand how organizational inertia shapes the implementation and outcomes of a digital transformation project through an empirical case. The empirical case is based on real-world technology implementation project, a pilot project preceding a larger global expansion. Case study was designed and completed by utilizing qualitative approach to understand the occurrence of complex theories in practice. The research was conducted through semi-structured interviews with eight participants from the implementation project team. The interviews were timed shortly after the pilot project was completed to gain recent experiences and reflections from participants towards the implementation project. The interviews were analyzed through pattern matching and theory triangulation.

The main findings of this study consists from the different organizational and individual level inertia manifestations in the implementation project as well as their interaction and effects to the implementation project. Ultimately, the findings described inertia's effects in shaping implementation project and the outcomes. The findings recognized economic, structural, socio technical and cognitive inertias manifest, interact and mutually reinforce each other during the transformation project. Study revealed a significant finding when cultural inertia was found to transform from initially a constraining factor towards implementation, to become an enabling factor through paradoxical duality. Furthermore, relationships and dependencies were found between different forms of inertia that extends the existing literature by practical examples uncovered in this study.

KEYWORDS: Digital transformation, organizational inertia, dynamic capabilities, strategic agility

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1 Introduction

Digital transformation has become a strategic imperative for companies to master in order to successfully respond and adapt to increasing turbulence in their operating environments. Digital transformation is driven by rapid advances in digital technologies and intensifying competitive pressure. Digital transformation is widely researched to affect an entire organization ranging from their strategic, structural, operational and cultural aspects (Correani et al., 2020). Digital transformation is affected by a great variety of organizational capabilities and resources that need to be aligned with the strategy and execution of the transformation (Doz & Kosonen, 2008; Correani et al., 2020). A significant proportion 66-84% of digital transformation fail due to misalignment between strategy formulation and execution (Correani et al, 2020). As digital transformation affects a large variety of organizational factors, one of the greatest threats to digital transformation success is organizational inertia. Literature recognizes organizational inertia to cause 70% of failed digital transformation initiatives (Haskamp et al., 2021). Inertia can manifest on an organizational or individual levels, and may cause resistance , or, constrains to digital transformation initiatives (Haskamp et al., 2021). However, to navigate the complex nature and elements of inertia, dynamic capabilities and strategic agility can be utilized to overcome and neutralize inertia (Gong & Ribiere, 2023; Haskamp et al., 2021). These capabilities are described to be foundational mechanisms (Gong & Ribiere, 2023; 2025; Teece, 2007) for success in digital transformation.

1.1 Research gap

The literature around digital transformation and organizational theories is extensive, accounting for strategy, leadership, capability and agility theories and dimensions. However, the extensive digital transformation literature does not discuss digital transformation from the theoretical foundation of dynamic capabilities (Vial, 2019). As dynamic capabilities are recognized as critical factors contributing to transformation success, Haskamp et al., (2021) notes that testing whether different dimensions of

inertia can be mitigated through participatory activities requires further studying. Haskamp et al. (2021) further note, that individual-level inertia's appearance in digital transformation activities remains unexplored. Considering these unexplored questions and phenomena from previous literature, they form a research gap to study and understand the manifestation of different dimensions and forms of inertia in a digital transformation project, and how dynamic capabilities interplay with inertia during a digital transformation project.

Thus, this thesis and its research was designed to study this gap by examining the manifestations and effects of organizational inertia factors to a real-life digital transformation. The main research question (RQ 1) aims to understand how does organizational inertia shape the implementation and outcomes of a digital transformation. To answer this question, organizational inertia and their significance towards implementation outcomes will be studied in context of a Case Company and their recent pilot project of a Manufacturing Execution System (MES) implementation project. To further understand organizational inertia and their effects, the second research question (RQ 2) asks how does organizational and individual-level inertia manifest and interact during the different phases of a technology implementation project. Finally, the effects of inertia manifestations and their interaction will be evaluated by the third research question (RQ 3), which aims to understand why those factors enable or hinder the success of the technology implementation project.

The empirical focus of this thesis is a Manufacturing Execution System (MES) implementation project conducted at Case Company, a construction material industry organization undergoing a broader digital transformation effort. The MES implementation project serves as a real-life case through which the dynamics of organizational inertia can be observed across the contexts of operational, middle management, and leadership levels, and across distinct phases of the implementation project.

Methodologically, the study adopts a qualitative single-case design, using semi-structured interviews with key participants in the MES implementation project as the primary source of data. This approach is suited to the exploratory and contextual nature of the research questions allowing for rich and phase-specific accounts of how inertia was experienced and managed across the organization.

1.2 Thesis structure

The thesis consists of five chapters. The second chapter consists of the literature review that introduces digital transformation as an overarching context within which this study is conducted in. The main focus of the literature review lies within organizational inertia literature to understand the different dimensions, nature and effects of inertia in digital transformation. Dynamic capability and strategic agility theories are introduced as their effect have been recognized to effect to the emergence of organizational inertia and related challenges in digital transformation, constituting organization's capacity for change. Combining these theories, literature review aims to form a comprehensive understanding of various organizational inertia, capability and agility elements that shape the outcomes of a digital transformation project. Following literature review, the third chapter describes the methodologies used to conduct a single-case study. The fourth chapter introduces the findings and results based on semi-structured interviews, that were primary source of data. The final chapter discusses the results of the study. The results are discussed in the context of research questions and compared to theoretical lenses to consider challenges or extended theories.



Figure 1. Structure of the thesis

2 Literature review

The literature and theories studied in this thesis focuses on forms and dimensions of organizational inertia in digital transformation context. Additionally, literature discusses dynamic capabilities and strategic agility theories in digital transformation and organizational inertia contexts. By incorporating multiple theories aim is to form a comprehensive context on these phenomena's interplay during digital transformation, and find explanations for factors of how and when organizational inertia occurs amidst a digital transformation, and how it shapes the implementation or outcomes of a transformation project.

The section is structured as follows: the background and context is started by studying digital transformation (DT) as a phenomenon and its various aspects that has been studied. This forms a basis for discussing disruptions in the digital technology space and how that affects companies' operational environment. From this context theories are next drawn from organizational theories and boundaries to discuss what constitutes and form companies' dynamic capabilities and strategic agility in digital transformational projects.

2.1 Digital transformation

2.1.1 Definitions and nature

“Organizations are constantly faced with new digital technologies that have the potential to transform the business models and organizational identities” (Müller et al., 2023). Digital transformation (DT) has been considered as a priority on business agendas, as the importance of digital technologies grows (Müller et al., 2023). The amount of publications in digital transformation literature has tripled over the last decade (Müller et al., 2023). DT has led to substantial changes in companies' activities, processes and capabilities (Correani et al., 2020). AlNuaimi et al. (2022) further describes, that digital transformation is a fundamental change in organization's way of delivering value.

According to Müller et al. (2023), many of the research articles have comprehensively identified different enablers, constraints, and produced frameworks and theories for both academics and practitioners, that can be used to best define and understand digital transformation. Gregory Vial's (2019) publication about understanding digital transformation is considered influential and many research papers following it are drawing definitions and basis from Vial's work. Digital transformation includes multiple dimensions and poses implications to organizations' strategies, vision, leadership, digital technologies, dynamic capabilities and strategic agility.

Vial (2019) constructed a conceptual definition of DT as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication and connectivity". Bharadwaj et al. (2013) defines digital technologies as combinations of information, computing, communication, and connectivity technologies, and that these technologies are the basis and catalyst for innovations.

As digital technologies and transformations are recognized to impact the technological side of organizations, Correani et al. (2020) note, that DT has led to substantial changes in companies' activities, processes and capabilities. Digital transformation is fundamentally about change and transforming the way organizations operate (Montasser et al., 2023). Müller et al. (2023) further describe DT as a comprehensive change process where an organization relies on digital technologies to transform its business model, services, products, or organizational identity. In his research, Vial (2019) also recognizes the vast implications and effects of digital transformation, as he finds that digital transformation must consider how digital technological advances can change business models, organizational structures and processes. Structural changes need to be carefully planned to leverage digital technologies for the benefit of the organization without forgoing financial constraints (Vial, 2019).

Fundamentally, the goals and expectations for a digital transformation project are to achieve benefits and improvements in operations and ways of working (Elia et al., 2024). Elia et al. further categorize these expectations into five categories: organizations expect 1) informational benefits, that considers wider access to and utilization of data inside an organization, that can be used to facilitate problem solving and enable data-driven decision-making; 2) transactional benefits, by organizations expect to gain increased efficiencies and transparency in their search, communications, coordination and new commercialization; 3) strategic benefits, by enabling organization to access new partners to find synergies with, find new networks and markets; 4) transformational benefits where organization seeks for improvements in competencies, improved resiliency and business continuity; and 5) societal or environmental benefits, that help organization to achieve positive impacts, such as offering better and wider access to services, improving customer and citizen participation.

2.1.2 Digital disruption

As DT aims for improvements and enhancements in organization's operations and commercial offering, it is also an attempt for an organization to reach stability through innovation (Wu et al., 2021). Digital technologies bring out disruption in the markets where firms operate in, and this poses pressure for organizations to find new ways how to remain competitive (Vial, 2019). Vial (2019) further summarizes, that digital technologies render firm's ability to sustain their competitive advantage more fragile than ever as they control fewer elements of their operating environment.

There are three types of disruptions by which prior researches describe digital transformation being disruptive: consumer behavior and expectations, competitive landscape and availability of data (Vial, 2019). According to Vial, as consumers who have access to information and communications capabilities anywhere and anytime, they become active participants towards organizations and their stakeholders. Furthermore, their expectations for service they expect are increasing. To better adjust into turbulent

environments, Bharadwaj et al. (2013) consider that digital technologies enable different forms of dynamic capabilities.

2.1.3 Digital strategy

Correani et al., (2020) defines digital strategy (DS) as a guiding policy for the creation and appropriation of value by exploiting digital technologies to achieve long-term organizational objectives. It is described to be a synergetic sum of information technology (IT) and Information Systems (IS) strategic initiatives that are driven by managerial decisions regarding the exploitation of available infrastructures (AlNuaimi et al., 2022). Al Nuaimi et al. (2022) further describe, that a comprehensive digital strategy identifies the specific business goals to be achieved through digital transformation, the selection of technological standards and architectures, and the concrete plans for deployment.

The literature highlights that that a well-defined digital strategy is the predominant success factor for digital transformation (AlNuaimi et al., 2022; Correani et al., 2020). In their research, Correani et al. (2020) described estimations according to which 66-84% of DT projects fail, one major challenge being a disconnection between strategy formulation and strategy implementation. Digital strategy's relevance is underscored by the following roles for business management: digital strategy addresses and bridges the gap between digital strategy and its execution gap, serves as an essential element business model transformation, strategic alignment, improving decision-making, coordination and governance within organization, motivation and communication (Correani et al. 2020; ANuaimi et al., 2022; Elia et al., 2024).

Correani et al. (2020) define digital strategy implementation as the concrete plans and actions of an organization to pursue their digital strategy. Correani et al. (2020) notes, that many digital transformation projects fail due to the disconnection between creating and executing a digital strategy, put differently, due to strategy-execution gap. This has been found to which cause significant financial and time costs for organizations for

undertaking a digital transformation project. Correani et al. (2020) make an important distinction regarding digital strategy and implementation: according to existing literature at the time, the role of a digital strategy is more highlighted than the role of implementation, and that the literature implicitly assumes that implementation will follow once strategy has been formulated. Contrary to this assumption, Correani et al. (2020) describes that effective strategy implementation is more critical for success in practice, rather than strategy formulation itself.

2.2 Organizational capacity for change

2.2.1 Dynamic capabilities

Dynamic capabilities is an essential framework for organizational survival and growth in volatile markets. Dynamic capabilities can be defined as an organization's ability to integrate, build and reconfigure internal and external competences to address and adapt to rapidly changing environments (Teece, 1997; Teece, 2007; Guerrero & Siegel, 2024).

Research divides dynamic capabilities into three core capabilities, that are sensing and shaping new opportunities, seizing new opportunities, and transforming or reconfiguring (Teece 2007; Guerrero & Siegel, 2024). Sensing and shaping opportunities refer to organization's capacity to scan, search and explore new opportunities, and threats, across markets and technologies (Teece, 2007). This includes anticipating and detecting customer needs and competitor activity and technological trajectories: phenomena that are effecting company's operating environment (Teece, 2007; Doz & Kosonen, 2008).

To seize an opportunity, it requires an organization to commit significant resources to development and commercialization: it must addressed through new products, processes or services (Teece, 2007). To capture the value of a new opportunity often requires strategic investments and the design of viable business models (Teece, 2007; Guerrero & Siegel, 2024). Teece (2007) points out that strategic success depends on

timing and inflexion points in technology and market evolution. Teece exemplifies this by describing that an organization may stay flexible until they've observed a clear dominant and winning design emerges in the industry, and then invest heavily in order to match that same design and, thus, seize the new opportunity through organizational design. Effective seizing also involves maintain and improving technological capabilities and competencies (Teece, 2007).

Transforming as a core capability refers to organization's ability to maintain competitiveness by enhancing, combining, protecting and reconfiguring the enterprise's tangible and intangible assets (Teece, 2007). Transforming involves continuous alignment, realignment and asset orchestration to escape unfavorable path dependencies; put differently, organizations must actively reallocate assets and resources to divert away from potential constraints and limitations that their previous strategies and decisions may have posed for the current strategic position the organization is in, and the future opportunities it wishes to pursue (Teece, 1997).

Sensing, seizing and transforming are significant capabilities that fundamentally differ from other organizational resources. In example, when considering operational capabilities that refer to performing administrative and production tasks, and organization-specific assets, these are essential for organizations to keep operating (Teece, 2007), but they focus on short-term operations and effects. In contrast, dynamic capabilities can be characterized as meta-competences that manipulate those resources to generate rents, or, revenues (Teece, 2007).

2.2.2 Strategic agility

Strategic agility is the ability of a firm to exploit or create changing patterns of resources deployment in a thoughtful and purposeful, but also fast and nimble way (Doz, 2019). Strategically agile firms are able to change direction quickly through their strategic sensitivity to strategic developments, make fast decisions and reconfiguring and - allocating their resources effectively and quickly (Doz & Kosonen, 2008; Reed, 2021).

These are also considered to be the three meta-capabilities of strategic agility: strategic sensitivity, leadership unity and resource fluidity (Doz & Kosonen, 2008; Doz, 2019).

In their meta-capability framework of strategic agility, Doz & Kosonen describe strategic sensitivity as the sharpness of perception and the intensity of the awareness and attention to strategic developments as they occur in real-time (Doz & Kosonen, 2008; Doz, 2019). Strategic sensitivity allows organizations to identify opportunities for new business models and sense when existing models require timely renewal. Strategic sensitivity can be fostered through open strategy process, that focuses on intellectual curiosity and high-quality internal dialogues (Doz, 2019). Doz & Kosonen (2008) suggest, that to sharpen its strategic sensitivity, leadership has to engage in anticipating changes, experimenting new possibilities and innovations, distancing themselves to gain perspective from their daily work abstracting to generalize and objectively consider their business models, and reframing their existing frames of the business.

Leadership unity is top management's ability to make bold and fast decisions without being hindered by politics (Doz & Kosonen, 2008; Doz, 2019). Leadership unity ensures that once a strategic decision has been made the organization can act with high energy and sincere alignment rather than dealing with passive-aggressive resistance (Doz, 2019). Leadership unity hinges on mutual dependency between executives, team unity, and a CEO who functions as a process architect (Doz, 2019). To enable leadership unity, Doz & Kosonen (2008) identify five actions that leadership should enforce: 1) dialogue, that is engagement in honest, open and rich dialogue around strategic issues, 2) revealing personal motives explicit to build trust, transparency and clarity, 3) integrating, to define a valuable common agenda that conditions success, and that builds interdependencies, 4) aligning common interests, and 5) caring to provide empathy and compassion, to provide sense of safety for playfulness and creativity.

Resource fluidity is an organization's internal capability to reconfigure capabilities and redeploy resources rapidly to new growth opportunities (Doz & Kosonen, 2008; Doz,

2019). Resources fluidity allows organization to free its resources from existing activities to potentially more beneficial activities and initiatives. Resource fluidity calls for flexible multi-dimensional structures, knowledge and people mobility between units, and by transparent modular business processes (Doz & Kosonen, 2008; Doz, 2019).

Strategic agility's benefit is contingent on the environment the organization is in (Reed, 2021). It is most valuable for younger firms at all levels of turbulence, but for older firms, it can be harmful in high-turbulence environments. In example, if a firm changes their strategy and direction too often, it can incur high costs and, thus, become unbeneficial for the firm. Reed (2021) exemplifies, that an organization achieves better performance when it becomes more agile in a less turbulent environment.

Organizational agility is defined as an organizations ability to quickly respond and proactively embrace unanticipated changes in dynamic environments through effective resource reconfiguration and rapid decision-making to gain competitive advantage (Gong & Ribiere, 2023; ANuaimi et al., 2022.). Organizational agility, or flexibility, allows a firm to survive and thrive in volatile, uncertain, complex, ambiguous (VUCA) conditions by continuously reviewing its resource base and business models (Gong & Ribiere, 2023; 2025). Gong & Ribiere (2023) propose, that organizational agility has three subdimensions: workforce agility, operation agility and network agility. Workforce agility refers to the ability of employees to strategically sense and respond to changes through continuous learning and autonomy. Operational agility refers to the ability to rapidly redeploy resources and use integrated IT systems to modularize internal processes. Network agility is described as the ability to quickly leverage external stakeholders such as customers and partners, for open innovation (Gong & Ribiere, 2023; 2025; Bharadwaj et al., 2013).

According to researches, organizational agility is considered to be distinct from flexibility and adaptability (Gong & Ribiere, 2023). Agility is characterized as broader concept, that requires massive structural and infrastructural changes to handle both predictable and

unpredictable disruptions. In contrast to agility, adaptability focuses on adjusting the internal structures to fit a forecasted environment often emphasizing cost sensitivity. Flexibility can be described as planned responsiveness, where the organization changes status within pre-established parameters, as in switching to another planned scenario (Gong & Ribiere, 2023).

In digital transformation context, organizational agility is characterized as a critical mechanism for the success of digital transformation initiatives as it works as a mediator. In this context, mediator refers to that resources need to be mobilized through agile capabilities to impact performance (Gong & Ribiere, 2023). Organizational agility helps manage uncertainty in digital transformation by encouraging quick and iterative experimentation and real-time adjustments of priorities (Correani et al., 2020; Huang et al., 2023; Gong & Ribiere, 2025). AlNuaimi et al. (2022) describe that organizational agility is manifested by continuous improvement and delivery, team and people maturity, and by appearance of four fundamental skills: responsiveness, flexibility, speed and competence.

Strategic agility and organizational agility are both needed in an organization because they operate at different levels of an organization, and address their own distinct aspects of the change process in digital transformation. Strategic agility provides the macro-level framework for business model transformation, organizational agility serves as the functional mechanism that is required to execute strategic shifts and handle continuous environmental turbulence (Doz & Kosonen, 2008; Doz, 2019).

2.2.3 Organizational inertia

Huang et al. (2023) recognize that digital transformation projects involve a high level of technological novelty, these changes require modernization of existing legacy systems that can cause change resistance. To mitigate and anticipate the resistance, Huang et al. note that this potential resistance raises questions about the ways and pace at which new technologies are introduced in an organization. Resistance is a derivative from

inertia, that is rooted in everyday work. To address it successfully, it is required to change the existing processes and ways of working more flexible when facing change (Vial, 2019). Furthermore, Montasser et al. (2023) note, that if the transformation is considered as a contradiction to existing state, it will face the most resistance. To alleviate this risk, the digital transformation must gain legitimacy from organization's internal belief system (AlNuaimi et al., 2022).

In the context of digital transformation, Haskamp et al. (2021) defines inertia as a form of resistance to change that is determined by path dependence, or, past experiences and historical decisions. Inertia is the resistance an organization faces when attempting to move away from its established routines and traditional business models (Huang et al., 2023; Montasser et al., 2023). Organizational inertia is recognized as a significant factor in the high failure rates that of digital transformation projects because it creates a disconnection between strategy formulation and implementation, or, strategy-execution gap (Huang et al., 2023; Correani et al., 2020). Vial (2019) recognizes inertia similarly as one of the most significant barriers in digital transformation. According to Vial (2019), inertia becomes relevant when existing resources and capabilities can act as barriers to disruption. Vial further states, that this highlights the relevance of an organization's path dependence, put differently, the sum of previous business decisions and development path as a constraining force for innovation through digital technologies (Vial, 2019). Correani et al. (2020) note, that 66-84% of digital transformation projects fail, and Haskamp et al. (2021) state, that 70% of digital transformation initiatives fail to meet their objectives.

Inertia is characterized to commonly stemming from overly rigid business practices and the inability to align traditional setups with new digital requirements (Huang et al., 2023). Haskamp et al. (2021) describes the occurrence of inertia in situations where the speed of an organization's internal reorganization is significantly lower than the rate at which, for instance, technological disruptions are changing and affecting the business.

Haskamp et al. (2021: 10) suggest that, “in an organization that introduces structural adjustments, transformation activities may result in different organizational groups that either favor or undermine the implemented structural adjustment. As a result, tension can arise between different actors competing for control over the interpretation of these adjustments”. Montasser et al. (2023) describes that inertia directly impacts a firm’s ability to achieve digital business model innovation as the organization struggles to reconfigure its internal resources and assets, connecting the inertia to the strengths of organization’s dynamic capabilities.

Organizations’ capabilities to overcome inertia are largely connected to dynamic capabilities and abilities and characteristics of leadership in digital transformation context. Dynamic capabilities, for instance, are considered as a primary mechanism to overcome inertia: Vial (2019: 133) notes here, that by “purposefully altering their resource base to increase their degree of fitness with their environment and ensure their survival”. Extending Vial’s characterization of dynamic capabilities, Haskamp et al.’s (2021: 7) characterization of paradoxical duality offers another layer to understanding and leveraging inertia: “Firstly, inertia is a part of a paradoxical duality. On the one hand, inertia and its positive manifestation of highly routinized organizational behavior is vital for organizational efficiency. On the other hand, it is exactly this high level of routinizing that turns into a barrier when adjustments are necessary”.

Huang et al. (2023) describes that adaptive leadership has been specifically designed to tackle adaptive challenges, that are problems which cannot be solved with existing knowledge and inertia. Huang et al. (2023), further describe that adaptive leaders create psychological safety into an organization that encourages experimental culture, so employees can modify their beliefs and routines through active involvement. Montasser et al. (2023) argues, that strong transformational leadership capabilities, more related to leader’s charismatic presence and behavior, are essential to incorporate agility and innovation to explain new digital ways of thinking as it can act as a catalyst to environment which motivates employees to do more than what is expected. Montasser

et al. (2023) also that organizational readiness serves as a precursor condition to overcoming inertia in transformation, as it has a crucial role in enabling sensing, coordination, learning, integration and reconfiguration using information technology.

Inertia is recognized to appear in various different forms and dimensions. Haskamp et al. (2021) divide inertia into three levels: individual-, organizational- and industry-level inertia. The following sections will discuss the individual- and organizational level inertias, their characteristics and effect on transformation initiatives.

2.2.3.1 Individual-level inertia

Haskamp et al. (2021) describe **cognitive inertia** to be a conscious decision to maintain existing decision-making paths despite the presence of new or contradictory information, representing rigidity in mental models of organizational members that weakens the ability to sense and adapt to change.

Behavioral inertia is described as unconscious reproduction of routines and habits where organizational members continue behaving with old ways working (Haskamp et al. 2021). Behavioral inertia can appear in digital transformation in ways were employees may choose to use new technology selectively or rarely, and revert to previous solutions. Jammulamadaka (2020) notes in their study, that behavioral inertia appeared as delegating tasks to others instead of learning by themselves, as the force of ingrained behavioral models in the organization. Jammulamadaka's (2020) finding is supported in Haskamp et al.'s (2021) study, that behavioral inertia can create momentum where employees actively undermine change by developing workarounds that allow them to stick to their previous, established habits, and thus, these routines can slow down the adoption process of a new technology.

Affective-based inertia refers to strong emotional attachment to the status quo in the pre-transformation context (Haskamp et al., 2021). Affective-based inertia can be triggered by uncertainty regarding how new technologies will affect an individual's role

or status, and this can manifest itself as frustration with the learning curve required for learning new digital tools (Haskamp et al. 2021). Affective-based inertia can be overcome by focusing on organization's cultural aspects: for instance, Jammulamadaka (2020) argues, that organizations must foster a deliberate learning culture that reduces potential shame and fear associated with lack of digital knowledge.

2.2.3.2 Organizational-level inertia

Structural inertia is the most referred to form of inertia in the literature. Organizational-level inertia is determined by company's past experiences and historical decisions, that manifests within a company's systems, structures and shared history (Haskamp et al., 2021). It consists of structural, cultural, socio-technical, political and economic inertia. It is the resistance rooted in the size, complexity and interdependence of a company's structures, procedures and processes. It slows the company's adjustments of their internal structures in response to environmental shifts (Montasser et al., 2023; Haskamp et al., 2021). Cultivating the ability to quickly redeploy resources and modularize functionality, or to put differently, strengthening organization's dynamic capabilities (Doz & Kosonen, 2028), can act as a moderator to reduce the negative consequences of structural inertia (Gong & Ribiere, 2023; Haskamp et al., 2021). Larger and more established companies are generally more prone to structural inertia, as they are constrained by path dependence, making them more exposed to major changes in their core processes than younger companies (Haskamp et al., 2021; Airikkala, 2021).

Cultural inertia is resistance that stems from informal norms, values, social networks and "myths" that have evolved within the organization over time (Haskamp et al., 2021). Cultural inertia is connected to behavioral inertia so, that it often serves to validate and protect individual behaviors, making the old ways of working a powerful barrier to transformation (Haskamp et al., 2021). Tripsas (2009) describes cultural inertia being particularly persistent to resist change as organization's existing capabilities, resource commitments, behavioral routines and cognitive frames frequently constrain an

organization's response to external change, even when the same elements helped foster success before, and this limits adaptive flexibility of organizations.

Socio-technical inertia describes rigidity between the interaction of human actors and information technology. Employees may resist change because they are habituated to existing systems. This inertia is considered to be rooted in everyday work of organizations, which means that simply introducing new technology is often insufficient; if the underlying operational processes are flawed, new digital tools may simply magnify those flaws (Wu et al., 2021; Vial, 2019). Socio-technical inertia is described to be the origin and source of employee resistance in many instances: the interplay between human factors and technologies, may cause the workers to actively undermine new technologies by sticking to the old non-digital workarounds because the new systems conflict with established social-technical patterns (Haskamp et al., 2021; Vial, 2019).

Economic inertia is resistance based on economic decisions related to the allocation of resources, specifically the conflict between exploiting the current business and exploring new digital paths (Haskamp et al. 2021). In digital transformation context the economic inertia often manifests as "stickiness", or as a failure to sufficiently fund new digital initiatives because of other potential rivaling priorities (Haskamp et al., 2021). Inertia can lead to failing resource allocations where an organization recognizes a digital threat, but refuses to divert enough capital or talent to combat it effectively.

2.3 Theoretical framework

The theoretical framework presented in this study provides an integrated lens for examining how organizational and individual inertia shapes the implementation and outcomes of digital transformation. The framework is built around a single empirical case: a Manufacturing Execution System (MES) implementation project serving as the unit of analysis, focusing on the interplay between inertia and the organizational mechanisms that counter it.

The framework (Figure 2) is structured across three layers. At the broadest level, digital disruption and competitive turbulence constitute the external context that creates the organizational pressure and necessity to transform (Vial, 2019; Wu et al., 2021). This environmental pressure establishes why transformation is initiated.

At the center of the framework is the digital transformation project itself. Digital transformation is understood as both a technological and an organizational change (Correani et al., 2020; Müller et al., 2023). The core tensions of the case study are observed here. On the left side of the illustration organizational inertia operates as a constraining force across three distinct dimensions: structural inertia, rooted in established routines, hierarchies and processes; cultural inertia, which is expressed through shared norms, values and resistance to change; and cognitive inertia, which derive from established and rooted mental models and path-dependent ways of thinking (Haskamp et al., 2021). These inertial forces show in which phases the transformation struggles in, and what outcomes it produces.

On the right side of the illustration, dynamic capabilities and strategic agility represent the enabling organizational mechanisms through which inertia can be recognized and counteracted. Where these mechanisms are present and correctly applied they enable the organization to sense the need for change, reconfigure resources, and maintain flexibility during implementation (Haskamp et al., 2021; Teece, 2007). In parts where these enablers are absent or underdeveloped, the gap between digital strategy and implementation practice grows (AlNuaimi et al., 2022; Correani et al., 2020).

Finally, the framework considers three categories of transformation outcome: successful implementation characterized by technology adoption and performance improvement achieved; inertia-driven failure affected by resistance, low system adoption, and potential revert back to old systems and routines; and partial transformation, where the project proceeds but produces unintended consequences or leaves significant gaps between the intended and realized change.

Together, these elements form the analytical structure through which the findings of this study are examined, guiding both the interpretation of interview data and the discussion of how organizational inertia enabled or hindered the success of the MES implementation project.

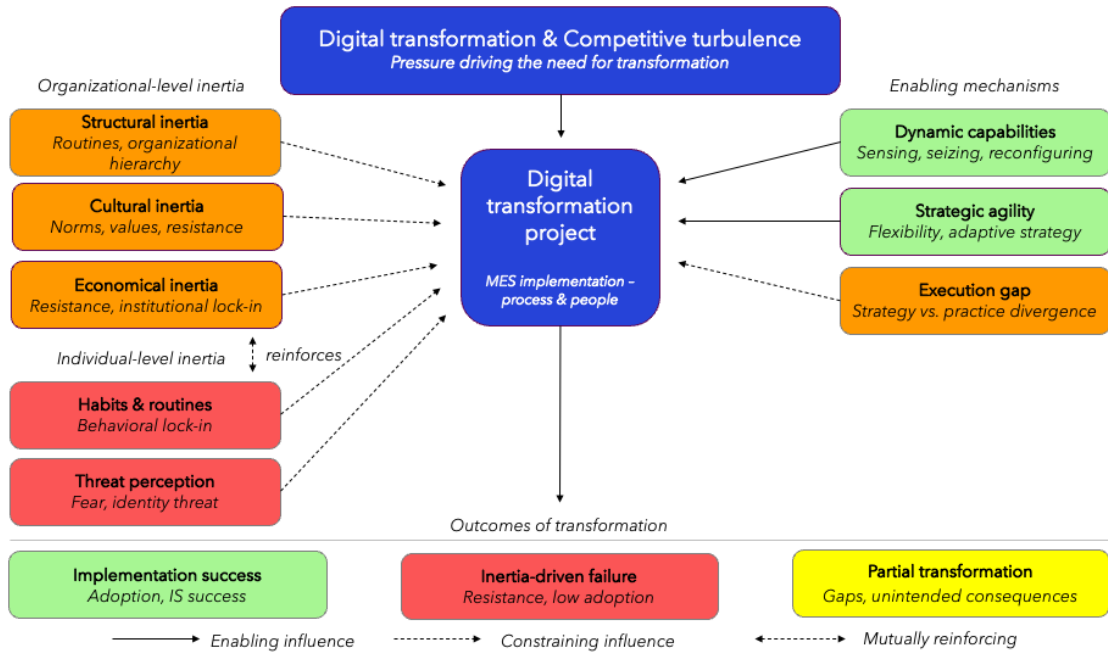


Figure 2. Synthesis of theoretical framework

3 Methodology

This section discusses and introduces the methodological basis for this study. The basis includes data collection and analysis methods, introducing the selection process for chosen Case Company and their pilot-project that was investigated. Furthermore, this section aims to address the validity and reliability of this research

3.1 Research method

In addition to academic and theoretical sources, frameworks and discussions, the thesis will study the research questions through qualitative approach. The qualitative approach to research is essentially search for a meaning, focusing on understanding the “why” and “how” behind human actions and social phenomena (Gillham, 2000: 10). The qualitative approach utilizes descriptive and inferential method to uncover possible explanations and to illuminate issues (Gillham, 2000: 10). Gillham (2000) describes that the fundamental objective of the qualitative approach is to generate an analysis of contexts and processes to enlighten the specific issues being researched. Qualitative approach strengths include: exploring complexities; it allows researchers to view the case situations from the perspective of those involved, to find the informal reality; focusing on processes leading to specific results; and allows for ethical and practical flexibility (Gillham, 2000: 11).

In qualitative research, O’Gorman and Macintosh (2014) characterize qualitative interviews as more conversational between the researcher and the subject. This approach to develop an understanding of central themes and research questions throughout the interviews. Furthermore, O’Gorman and Macintosh (2014) note, that in qualitative interviews it is crucial to have access to appropriate participants and it must be realistic. Therefore, semi-structured interviews were chosen for their flexibility to establish a structured and standardized starting point (Gillham, 2000). Semi-structured interviews allows the interviews to delve deeper into the phenomena with the respondents through a more discussive interview. This allows maneuverability and depth

to the conversations and interviews, for instance, in case of sensitive discussion topics that the respondent would not like to discuss or disclose, to understand potential background factors affecting to the discussion.

A single case study was selected as the research strategy for the thesis over multi-case comparative approach. Gillham (2000) argues, that case studies are most appropriate when the investigated phenomenon cannot be explicitly isolated from the context in which it occurs. This condition applies directly to the case study: organizational inertia are relational and contextual phenomena that only become analytically intelligible when studied within the conditions that produced them. The single-case design was chosen deliberately, as the objective of this thesis is depth of understanding rather than breadth of coverage. The empirical case is a technology implementation pilot project carried out by a case company. The case study was examined through interviews with eight employees from different levels and functions of the pilot organizations, and who took part in the implementation project.

The research is designed to utilize primary data sources to understand the manifestations and effects of organizational inertia in a real life technology implementation project. Furthermore, intention is to understand complexities and interdependencies of organizational inertia theories during digital transformation.

3.2 Data collection and analysis

This thesis investigates a single pilot project of a new technology implementation of Case Company, to understand how organizational inertia shape the implementation and outcomes of a digital transformation project, how they manifest during an implementation project, and why they either enable or hinder the success of the implementation.

Primary data was collected through interviewing individual employees, middle management and leadership representatives that took part in the MES-implementation

project. The participants represent different functions within production department of the organization, and work on different parts of the organization: operative level employees, middle and top management in Finland, and also management representative in group-level. Altogether, eight employees of the Case Company were interviewed. The role and participation of these participants, and access to interview them yielded rich and relevant data. This access O’Gorman and Macintosh (2014) describe to be vital for research success.

The interview questions (Appendix 1) were designed from the basis of theoretical framework (Figure 2) to cover the as much of the inertia related phenomena as possible in different project phases: participants’ and respondents’ role and background in company and in implementation, attitudes towards change and MES implementation, managerial actions and management’s participation to project, organization’s reactions to challenges and surprises, learning during the project, and finally, results and impact of the project. Through question design the goal was to form understanding of the project and its progression through different phases, and uncover patterns, similarities, and discrepancies within case company’s responses and observations, and with the theoretical framework. These interviews yielded great variety of perspectives on the progression and completion of the MES-implementation project, and interestingly in parts, conflicting answers. During the interviews, semi-structure interview format enabled the conversation and questions to deepen the conversation.

To ensure the quality of data, O’Gorman and Macintosh (2014) note that qualitative interviews involve a conversation between the researcher and the subject, the engagements and the participants need to be briefed of the purpose of the project. Prior to interviews, in this research all respondents were dealt with a letter introducing the research and interview agenda. This provided context of the thesis and in what setting the interviews were to be conducted in. Furthermore, the interview questions were provided with the respondents in advance to offer transparency and a chance for

preparation. Additionally, to alleviate potential friction to receive answers for potentially sensitive-nature questions, respondents were offered anonymity as needed.

Timing-wise, the pilot-project was completed during August 2025 and January 2026, and the interviews were held during April 2026. The timing of the interviews provide a good opportunity to gain objective answers as the project completion is still fresh in memory and the system adoption and the use has started (O’Gorman and Macintosh, 2014). Interviewees are described anonymously as respondents (R) and by interview number, following logic such as Respondent 1 (R1), Respondent 2 (R2), Respondent 3 (R3).

The respondents were interviewed remotely using Microsoft Teams online meeting solution. Meeting transcripts were then analyzed for findings and conducting the intended research. Each interview meeting were booked for 45-60 minutes. Altogether, 280 pages of interview transcription were analyzed to produce the findings. The respondents were briefed prior to interviews with an introductory letter containing background information and purpose of the interview and the research. Also, the interview questions were shared to participants beforehand to allow for preparation.

Table 1. Description of interview count, duration and transcription

Amount of interviews	8
Interview duration	á 45-60 minutes
Transcribed content	280 pages
Interview tools	Microsoft Teams Meetings & Transcription

According to Gibbert et al. (2008), assessing the quality of data can be done through internal construct and external validity, and reliability. Construct validity refers to a clear chain of evidence that a reader is able to reconstruct the process from the initial questions to final remarks; internal validity focuses on the causal relationships between variables and results; external validity assesses whether the findings of the research can be generalized beyond the studied project; reliability which refers to the possibility of

replicating the study and reaching same results or insights (Gibbert et al., 2008). The data was analyzed by using pattern matching, formulating a research framework (Figure 2) and theory triangulation (Gibbert et al., 2008). The research framework (Figure 2) was presented in literature review and describes the known interdependencies and causalities within the literature between different theoretical lenses. The multiple theoretical angles, or theory triangulation, is used to interpret findings and theory (Gibbert et al., 2008). This research introduces a revised theoretical framework based on the findings from the interviews. Pattern matching is utilized in the analysis to understand how findings are linked to existing literature and different contexts, and whether case study reveals discrepancies or variations (Gibbert et al., 2008).

3.3 Case Company

Case Company (CC) is a privately held European company. Case Company operates in construction materials industry manufacturing fibre cement materials and products for façade and interior building purposes. Case Company distributes and sells its products mainly across Europe, with a strong positioning in the premium and design-driven segments of the construction materials market. At the time of writing Case Company employs approximately 2300 employees across its international operations in branch offices and 8 factories.

CC qualified to this research as a case company because it has recently implemented a pilot project of a new Manufacturing Execution System (MES). The pilot project was carried out in a branch office in Finland with a goal to be later scaled to other operating regions.

3.3.1 Management Execution system

Manufacturing Execution Systems (MES) are computerized systems used in manufacturing processes to track and document the transformation of raw materials to finished goods. MES provides information to production that helps manufacturing

decisions-makers understand how current conditions on the plant floor can be optimized to improve production output. MES typically works between the planning and control systems in an organization, such as Enterprise Resource Planning (ERP) system and the actual manufacturing operations on the floor (IBM, 2025; SAP, n.d.).

4 Findings

This section discusses the findings that were uncovered during the interviews. The interviews covered the following main aspects: interviewees' role in the organization and participation in the MES-project, background and start of the MES implementation project, the implementation phase, managerial participation, learnings and collaboration during the project, results and impact. The interviews included 8 employees from different levels and parts of the organization that partook in the implementation: end-users, operative, middle management and leadership level respondents.

This section introduces the project narrative how the MES implementation was initially planned, scoped and organized, and how the project was executed. The following sections describe findings inertia-specifically.

4.1 Project narrative

The Case Company completed an implementation project of a new MES solution during August 2025-January 2026. Prior to MES, the data collection from works stations and machinery was done by factory operators by inputting data into separate spreadsheets and ERP directly. Over time this manual data entry caused errors in spreadsheet and ERP data, which accumulated to larger discrepancies in reporting. These discrepancies needed to be balanced by the office staff, consisting from a mix of operative, middle management and leadership level personnel later to gain an accurate view of and ensure the quality of the data. Management and leadership would be able to conduct analysis and reporting from this basis, and support leadership's decision-making. To compensate these manual data entry steps, Case Company had created workaround solutions, such as Power BI reports, to compile data sources and data together into more visualized and sensible format for the management team to analyze, report and make decisions based on the data. The described way of working had become a well-established and documented process over time and had become a stable, standard operating model. The

users were accustomed to the operating model, so in case of errors they were easily noticed and fixed when noticed.

To address these manual work tasks, a MES solution was purchased with concrete goals to increase data accuracy, improve data quality and automate data collection directly from factory machinery. The motivations and value for purchasing and implementing MES were derivative from group level initiative to roll out a global MES solution for all factory sites, to improve group's production efficiency across all regions. Ultimately, MES would remove the human operator's manual data entry tasks, and holistically collect, monitor and visualize production data in real-time.

The MES implementation in Finland served as a pilot project for the group organization embarking on a larger digital transformation journey. The pilot project would showcase not only the implementation of the new technology, but also share project team's experiences, learnings and observations from the pilot to a group-level project organization. Sharing the learnings would help set up the group organizations for success for future global expansion of MES within the group. The pilot project was decided to be completed in Finland branch due to their comparatively simple production operations, advanced ERP usage, overall digitalization and the organization's considered maturity and readiness: the culture was described as problem-solving, development oriented and open-minded. Compared to other operating regions and factories within the group, Finland was determined to be the most suitable organization to conduct the pilot project in.

Project's initial planning and procurement was done by a group-level project team that consisted of members from across the group's other factories and organizations, and group management. Finland's Plant Director, at the time, was chosen to head the project. The planning and scoping of the MES implementation was decided in this team. The project was decided to be conducted as a Minimum Viable Product (MVP) approach, which would that would emphasize and focus on to delivering the most essential

capabilities of the new MES solution. The timeline for the implementation was decided to take place between August and December 2025, goal being to start the new fiscal year with a new MES solution up and running, to start gathering and cumulating data from the beginning of the year. The decision for implementation's timeline was made from the recommendation and estimates of the vendor, or, the implementation partner, and their experience on similarly scoped projects.

Separate from the initial project planning organization, the pilot organization formed their own project team of two full-time employees. This project team would have mandate on project's operative management, decide on project resourcing locally and divide tasks during the implementation as needed. Altogether, the project team included six members that worked in different parts and levels across the pilot organization. As the project team was responsible for operative decisions regarding the implementation project, Case Company formed a steering committee that consisted of management and leadership members from other group organizations. Steering committee's responsibilities were to communicate the pilot progress further to the group and act as an organ to strategically oversee the implementation progression and act as an governing entity to approve changes or requests made by the project team. This dual-governance model was established to ensure agility in project.

The implementation progressed in phases that were determined by the partner's project model. Case Company outsourced the project's management to the partner and accepted their project model for the implementation, as the pilot organization considered itself more as n operative rather than project organization. Project's technical configurations and building were planed from the basis of a functional design specification (FDS) document, that the partner had compiled based on the initial project requirements formed during the vendor and solution selection process.

The project team members were included to the project in different phases as their experience and knowledge was needed. Some were needed in the beginning of the

project for further defining the technical aspects and requirements as well as reconfiguring parts of the ERP to ensure compatibility with the MES. Throughout the implementation, both project teams worked regularly and actively together, and with the partner, engaging with their respective responsibilities and tasks, and documenting the progress. The communication and collaboration were held in shared messaging platforms, meetings and workshops, later in “big room” testing as well as through documentation.

The implementation project phased a large variety of challenges and surprises that started to accumulate quickly after the project kick-off. Challenges occurred in all phases throughout the implementation project deriving from initial economical and structural decisions, cultural challenges and individuals’ resistance towards MES implementation. These challenges emerged communication issues, ambiguity, insufficient resourcing, extreme time pressure, frustration and stress on all participant levels. There were a large variety of organizational inertia-related reasons behind these challenges. The challenges caused delays to the project progression. The new MES went online in mid-January 2026 exceeding the original schedule by only two weeks. Next, user trainings and support started. The new MES was then presented for the steering committee members.

4.2 Inertia during transformation

This section examines and presents findings in detail, deepening the project narrative through concrete examples and responses by the project participants. Through these responses, the section observes forms of inertia during the implementation project. The findings are presented based on conducted semi-structured interviews for eight project participants across different levels and functions of the Case Company’s pilot organization. The findings will be discussed in inertia-specific sections.

MES implementation faced a multitude of challenges throughout the project caused by different forms of inertia. The inertias observed can be categorized under both organizational and individual-level inertias. The inertias showed interdependencies with

one another and they overlapped in implementation's different phases. The inertia findings and challenges they caused will be discussed individually in the following sections.

4.2.1 Organizational level inertia

On organizational-level the challenges occurred as structural, cultural, socio-technical and economic inertia. These inertia factors were the most prominent and had significant impacts to the implementation project.

4.2.1.1 Structural inertia

Structural inertia took form of challenges that derived from decisions made during the procurement and planning stages of MES project before the implementation, and challenges during decision-making during the implementation project. The challenges centered on resources gaps within the project as well as efficiencies in planning.

One of the first challenges that emerged regarding project resourcing related to key personnel shifts. The original project structure was disrupted by the relocation of project's main architect, Respondent 4, to Central Europe, shifting from originally intended original project manager role in the implementation to obtain only a steering committee-level involvement to the project. This forced local leaders into double roles, creating a ripple effect of increased workload for other teams.

"Originally, our Plant Director [at the time] was supposed to lead the project, but quite quickly before the start of the implementation it was realized that it would be best to hand over the project management to a separate person, and then [Respondent 1] was chosen for the task. The plans changed in the very early stages before project kick-off." (R3)

The project was decided to be run by a dual-governance model where a local project team would be responsible for the operative execution of the implementation as well as deciding and coordinating local resourcing. A steering committee's role was to oversee

the pilot on a more strategic level and participate into strategic decisions, for instance related to financing, group-wide alignment, including factory managers from other regions. The purpose for this arrangement was to balance the strategic group-level managing with local operations-led implementation execution.

One of the core decisions affecting the project was to lead the implementation by operations rather than IT. This was a conscious decisions made in the planning project team before implementation, intended to keep the implementation project effective and straight-forward without complicating it with technical discussions.

“During the many times I discussed with the partner, they said that according to their experience, and where we had made the right decision, was that our project was operations-led. A lot of times MES projects are led by IT, and according to partner’s experience the success percentage is many times higher in the project where operations is in the lead rather than IT.” (R4)

However, IT representative was excluded from both project team and the steering group. This decision caused significant bottlenecks and interrelated ambiguity among the project team, such as not fully understanding the technical requirements, and later during the project having to compete for IT resources with another global priority project. Thus, resourcing gap was created which emerged later as challenges. The root cause was said to relate to the intention of keeping project implementation practical and not so technical.

“We did not have anyone from IT appointed to this project. For some reason IT also came into the project very late, and I can’t say why, but then in middle of everything they appointed permanent responsible people to the project.” (R3)

“But for us the IT was completely left out from the steering committee, we didn’t have a representative there at all. At some point there was some strategic guidance, we had a couple oof IT representatives visit the committee but they were never really involved in planning or guiding the project. There unfortunately was little of any kind of guiding support from steering committee. That, I think was a clear failure from us. ” (R1)

“Not having IT involved in the project team nor the steering committee since the start of the implementation, that has put the project, but also the project to an

interesting situation., as we have had expertise on matters, but not on that deep level, that IT person would discuss with IT person. That was one of the biggest challenges in the beginning, as we did not understand the technical specification on the level as we probably should have.” (R3)

Once the project was started, the project management was decided to be outsourced to the implementing partner. Case Company accepted partner’s project model according to which progression, milestones, decisions and designs where to be made. The outsourcing of project management emerged challenges in daily project execution and collaboration with the partner as respondents’ noted complexities and uncertainty which derived from resourcing and awareness issues. Furthermore, partner’s process understanding was found insufficient and cause misunderstandings. For instance, the project was described to lack clear and anticipated decision-making points, having an abstract and overly complex specification documentation without a visual map of task dependencies, and issues with integration complexity. These challenges emerged frustration, fatigue and demotivation of project participants.

“We have lacked a critical path. Clear decision-making points.” (R3)

“We are not just talking about insufficient personnel resources, but in general. [in the beginning of the project] They seemed sufficient in the beginning. I guess that it was affected by the original project architect relocating abroad and was transitioned to more supporting role.” (R7)

“The partner should have familiarized themselves to our operations and processes by physically visiting the plant. – I perceived that that they really don’t know it well, and yes there were messaging through Teams about the issues, but it’s not the same thing.” (R6)

Furthermore, through the structural decisions, project team’s autonomy was limited to locally manage and coordinate execution of project, while decision-making authority relating to additional costs, scope or group-level support resources were centralized to the steering committee. The division was found to slow down decision-making, which in turn, created delays in the already high time pressure in an already stressful and

frustrating situation. These effects were further reinforced by economic inertia manifesting as insufficient resourcing for the project.

4.2.1.2 Economic inertia

The most significant forms of inertia through the case study was related to **economic inertia**, which Haskamp et al. (2021) defines as resistance based on economic decisions related to the allocation of resources. More specifically, economic inertia appeared in project personnel and time resourcing, and scoping.

From the very beginning, the project was decided to be a pilot project for the whole organization, and that it would be implemented by following 'MVP principles' for it be cost effective in terms of both time financial resourcing. The scoping were based on the requirements for MES, that were gathered by the initial project team lead by former Plant Director of Finland. The initial project team's members were together responsible for planning, scoping and managing the purchase process of a group-wide MES solution. The former Plant Director of Finland had a long career in Finland's organization, which lead to assuming an adequate view of operative needs for the solution. The pilot project and MVP's scope were carved out from these specifications.

"...our former Plant Director always wanted to have MES. He has come from production and progressed to become a Plant Director." (R2)

The project was resourced with a project team consisting of two full-time members from Finland's organization supported by other members from the organization as their role and expertise were needed throughout the implementation. The steering committee was established to act as an group-level representative and overlooking on pilot progression, and if necessary, act as resourcing and approval entity between pilot project and group-organization.

Respondents describe that throughout the project leadership maintained an extreme time pressure as they pushed project forward to keep the implementation in schedule. The project team had accepted to follow implementation partner's project model, which caused nontransparency and ambiguity to the implementation. This accumulated to time extreme time pressure frustrated and caused stress among the project team which occasionally lead to quick decisions on matters they did not have clear understanding on.

"In the end, the critical path was missing. For example, it did not include information of what needs to be completed by when, because if it isn't then the next phase does not complete." (R1)

For instance, respondents described that the project was not resourced with a member from IT organization, with whom the technical questions and issues would have been better resolved and understood. The lack of IT resource was explained by rivaling and prioritized group-wide technology project.

"What was critical not having an IT representative in the steering group, was that we did not understand what kind of resources is required from their [IT's] side, and that we did not realize to request those resources early enough, and when they [IT] finally realized the situation, they said that they would have needed a lot more time to do certain things." (R1)

"When IT has not been involved in the project team, nor in the steering group, since the beginning, it has put this project team into an interesting situation, that we have not had expertise in a deep enough level, that IT guy would be talking with the IT guy." (R3)

"Our greatest challenges related to our internal collaboration with IT. At the same time [with MES pilot] we had a global ERP project running, so one can conclude which one is of higher priority." (R4).

Furthermore, ambiguity and scoping issues arose throughout in the project in many examples: key personnel changes took place in the project team as the former Director for Finland relocated to Central Europe, taking the first-hand project and planning knowledge away; the MVP did not include all necessary elements for the Case Company's intended users and surfaced additional work and expenses not covered in

the MVP which lead to financial excess in the project. Respondents noted that these issues manifested in the testing phase as licensing issues, that needed to be separately sorted out in steering committee hindering the progress and efficiency of testing in the high time pressure. Put together, these factors showcase that economical decisions of the project's leadership constrained the implementing organization by insufficient resourcing in personnel, time and underestimated scoping for technological capabilities.

4.2.1.3 Cultural inertia

From a cultural perspective, the MES implementation was seen as both a recognition to Finland's problem-solving mindset and a challenge to its operational routines. Respondents describe the culture as flexible and open, yet rooted in stable and long-term habits that resisted the disruption of the new MES. This organizational culture was one of the specific reasons why Finland was chosen for the pilot. The culture was perceived as having a high readiness to solve problems and willingness to try new things.

"In Finland's organization there are a lot of people that are willing to develop operations in any context. We talk about a standard readiness to solve problems that comes in front of us. IT was pretty good that people there stretch and look for the solutions, so that the project will progress as intended." (R4)

A recurring cultural theme that surfaced relates to organization's identity. Respondents described that the organization identifies itself as operational rather than a project-led organization. Additionally, respondent describe that their organization's capabilities do not extend to systematic and long term project management.

"We are more of an operative organization where there is also development initiatives. Continuous improvement is done and occasionally very fast improvements. However, a systematic and long-term type of working is not always necessarily our strength, and often project require certain type of guidance and monitoring." (R3)

Operational and middle-management level respondents describe that at the time of announcing the implementation project, the initial thoughts were skeptical and slightly negative. These were described to derive from the stability and routinized ways of working.

“The feeling I had, and what I heard from elsewhere in the production organization, was that the attitudes were skeptical [towards MES].” (R6)

“The feeling was skeptically negative, as everybody knew that the ERP is very inefficient and full of bugs, and when you understand that the MES will be using and guiding the ERP in the background, so in that sense the starting position is negative, because does not fix the problems with ERP.” (R8)

“It [MES] was much expected. It was being hyped about for a long time, and let’s say that I was slightly reserved.” (R5)

Case Company had established and standardized operating procedures in place that had formed over the last 10 years, since the renewal of ERP. Since then, when coming across errors, these could be easily noticed and fixed. In general, the pre-existing ERP-Excel hybrid was already working on an exceptionally high level, having recently produced the most accurate inventory results ever.

“Our December’s inventory result might have been the most accurate ever, it was even though people were logging things into ERP directly. – there were good instructions and everything always went the same way so a routine was formed to it.” (R5)

4.2.1.4 Socio-technical inertia

Respondents reported observations that can be categorized as **socio-technical inertia**. Based on Haskamp et al.’s (2021) definition, the interplay between users and the new MES was challenging when the testing and adoption of the MES began. Respondents described increased frustration among employees towards having to learn to use a new tool. This reflects on observations regarding the cultural inertia findings, where teams had been accustomed to the pre-existing working methods and workarounds that drove similar inputs and purpose as the new MES. Furthermore, there were individual

instances where a more vocal expressions of frustration were shown, questioning the need for a new IT system altogether. These frustrations peaked during the testing phase as extreme and unyielding time pressure, and licensing issues hindered the efficiency of the testing.

“When we got to do user testing, what was working in the morning was not working in the afternoon anymore. The testing was really, really sticky. It was partially because of us ourselves but also because of licensing issues. Also, some effect from partner’s side as we did not always work on the same issues”. (R5)

After the implementation was complete and the pilot system went live, issues with the actual data and information flow between teams and departments started to arise. The time pressure caused the testing to be done very quickly and the MES was launched unfinished to maintain the pilot’s completion schedule.

“There was a group of leaders coming in from the group to see how the MES is working. I was very sure that it [MES] won’t be ready then, just to get one [production] line up and running, we had to make a huge sprint with the project manager so that we got everything pushed through. – It was a conscious decision to go live with an unfinished solution.” (R2)

“The pressure was high, most likely from the steering group, that we needed to go live [with MES], but as a team we agreed that this is not ready. The pressure was high, and I don’t think it was a good thing.” (R6).

The end-user trainings started in January, and despite the best efforts and active presence of the project team and leadership, the users resisted using the new MES as they did not feel to have had enough time to practice and train with the new system. One respondent noted, that in the factory floor the operators have their own ‘agreements’ regarding the use of IT systems in the work stations: for instance, there are agreements which one from a working pair is responsible for using the IT systems, in some cases older employees default letting or making younger colleagues to use IT systems. As frustrations arose regarding learning to use the new MES, there were

observations for individual employees not caring about incorrect system use or errors, and just passing the steps in MES as completed and transferring the issue forward.

“There are operating models [in factory floor] that there might be a working pair where one is in their 20s and the other one on their 60s, so the younger one always handles these computer stuff. But when there’s a situation that the younger worker is on sick leave and the replacing worker is also a more “seasoned” colleague, neither of those older workers know how to do the IT part, then it easily becomes a challenging situation. These kind of mutual agreements have been around over time, that both in that working pair are trained to use the systems, but only one of them actually uses the system.” (R8)

Against the initial goals for MES to automate and streamline information flow from machinery to ERP via MES, the data error issues shifted from operators towards production planning and middle-management. This was described due to the system characteristics and integration where the errors were not highlighted as they occurred, but they moved forward in the process, and starting from production planning and middle management level employees were able to notice and fix these errors. Thus, workload was increased in managing the new MES and ERP.

“My daily morning show – I checked how many [MES] messages had failed or not gone through, I’m doing that kind of clicking. I first fix the error, but after that click through the messages, so it is kind of unnecessary work that we did not expect, that there would be so much of it, and that is a big minus for MES.” (R1)

“There could be 20-30 errors coming through back and forth, so we usually fix these as a morning bundle. There we check the failed messages and take action. Not good, and very employing effect, my and my coworker’s work has increased with MES.” (R6)

4.2.1.5 Cognitive inertia

Cognitive inertia represents a dimension of inertia that occurs on the individual-level relating to individuals’ mental models and beliefs (Haskamp et al., 2021). The interviews uncovered cognitive inertia during the implementation project when respondents described mental models and attitudes towards during the project.

Cognitive inertia could be observed on different phases of the project. Leadership encountered the first forms of inertia years before the MES procurement and implementation project, as the top management at the time could not understand the value behind automated data collection, and thus the necessity for MES system. This led to nearly ten years of arduous work by the Plant Director [Respondent 4] until the project finally materialized.

"Maybe there wasn't enough understanding on the top management, about what the benefits of the MES are for companies. The value of automatic data collection was not understood." (R4)

The internal discussions changed and the MES's value was highlighted four years ago as a new director joined the Case Company from an organization that utilized a MES, showing the shift in support and motivation towards digitally transforming Case Company's operations.

"-- I received a new supervisor [director] who had previously been working a long time at a company that was far-digitalized and using a MES where, and where the manager had participated, and knew exactly what kind of a system it [MES] was, so the conversation was easier when the counterpart knew what we were talking about." (R4)

As the MES was implemented, leadership had recognized early on that in order for the new system to fit in their operations, operating models needed to be adjusted. The operating model development were required as the MES would change the logic of how data flows forward from workstations and factory machinery into production planning and management. Here, the operator inputs would shift from previous tools and systems to the new MES. Communicating this change in operating model and value of MES faced resistance among operational level employees.

"Usually it is like that in production environments. When you implement new systems and arrangements, the employees question that 'why a new system again and how does it benefit us, and won't the old systems be enough, and that we have

to learn something new again, it was more likely general resistance towards systems rather than to this system specifically”(R4)

In contrast to generally observed cognitive inertia, the operators in the factory floor were described to have a positive buy-in for the MES solution, as it was communicated as a solution that would eliminate manual paperwork and repetitive data entry, that was described as “useless”. There were also described to be slightly hopeful attitudes towards MES if it were to eliminate the use and filling of Excels.

“Operators have done the ERP reporting for years, so they understood very quickly that they never really liked the reporting. It has been very complex, and that it should become easier, so this was a good way to get the MES sold to them. Another thing was that that they want to get rid of Excels. They understood that it’s going to be a difficult road, but there was a little hope to get rid of something. And in the office side there was even more hopeful thoughts about MES would solve a lot of problems as we had recognized the issues the manual data entry errors caused all around. ”(R1)

“Of course, people go along with the change in different phases, some go along right away. Some resists and grumbles a bit more before they get on the same page with everyone, but I would say that our people have been very flexible here and especially for the operators this [MES] has been sold that their work is going to get easier and they will eventually get rid of the extra reporting. And they have been satisfied about that this has actually happened.” (R3)

Operative-level respondent also describes that the general involvement was positive and active as the organizational members understood they have the chance to be involved in the development, and everyone wanted the project to succeed.

“The participation and their comments [in testing] were golden for [the project manager] and what the project manager can pass along. So in that sense, the activity and that and that everyone wanted it to be good. And when they saw that there was an opportunity to influence the project and bring ideas forward, they were done so. I would say that in production workstation employees had the most positive attitude [towards the project]. ” (R2)

When the implementation project initially began, as noted previously in structural and economic inertia findings, the insufficient personnel resourcing caused persisting

challenges for the project. In the beginning of the project when resourcing was planned, it was affected by leadership's and project manager's existing mental models, of their perception of business processes. Respondents had overestimated their knowledge of business processes and simultaneously underestimated the complexity of the technology implementation.

"We were in an understanding with [Project Manager], and [former Plant director] also believed, that we know our own operations well and that we're dealing with rather simple things here. Within this belief the project resourcing was also originally done." (R3)

This was later described to cause ambiguity and confusion, highlighting the insufficient personnel resourcing and lack of IT representative

4.2.2 Project success

When evaluating the project's outcomes and success, the project team's experiences were divided. Out of the eight respondents, three considered the project to be successful, two considered it as a failure, and the remaining three respondents considered the project to be somewhat successful. Interestingly, all participants noted that the success depends on the perspective. On leadership level, a respondent part of the steering committee, considered the project as successful by simply launching MES into use. The other leadership-level respondent, a part of the implementing project team, considered it to be somewhat successful due to the massive learning curve and experience the team had to go through. This, in turn, serves great value and compensates the hard metrics set for the project. However, leadership level respondents acknowledged that if project's hard metrics and KPIs are considered, then the project did not succeed. Success, thus, seems subjective in the leadership level. Why this difference occurred, can be mostly explained by the involvement and experiences of each respondent in the project, but they necessarily don't fully describe and explain the somewhat subjective and alternative perspectives.

In middle management level there were more skepticism in the beginning of the project, that carried in this instant was for one to get the MES launched, for other one the learning journey and experience of their own organization made the project successful. Middle management respondents varied in their evaluations. In operative level, the respondents described the project having failed due to pre-existing data issues, which necessitated manual workarounds and compensation to fix errors – issues that only surfaced after launch of the MES. Furthermore, the enormous time pressure that challenged the peoples individual learning capabilities in hasty user training sessions, which were very limited due to licensing issues that derived from structural issues. This, lost time, caused frustration among middle management.

When respondents reflected on the project's success, the answers were divided depending on whether they prioritized hard metrics and technical KPIs, such as schedule and budget, or strategic organizational benefits, such as organizational learning and data integrity.

Project was considered successful because it was described to have achieved its primary goals by being launched into use, and reducing the manual data entry errors. In addition, outside the initial project goals as the implementation project required the project team to fix long-standing errors in the ERP was significant achievement enough to compensate missing other hard goals for the implementation. Furthermore, project's success was also characterized by the MES's capabilities and ease of use for operators.

“Even though there were hiccups and difficulties we did succeed quite well against the original goals considering all other organizational and resource-affecting changes that was faced along the project that we did not see when we started the project.” (R4)

“Yes, I'd say the project was successful. I told a production planner that even if this would not succeed, we have been able straighten-out [ERP] so much, that one can be satisfied. ” (R1)

“It went OK in the end. It was quite much living in the moment and reacting to everything.” (R2)

In contrast, respondents who viewed the project as failed compared the outcomes to the original goals set for the implementation, highlighting the significant time pressure and other practicalities relating to system integration and vendor's insufficient process knowledge. In addition, respondents described the project's schedule to be too ambitious and added manual data reconciliation tasks, which is against the intended goal to simplify work.

"No, it was not successful in my opinion. Of course I could say that partially [successful] and that it will get there, become to what was expected. I don't doubt that. But the system integration is still, and it has been the biggest challenge in my opinion." (R6)

"In my eyes, it only complicates things, but it does not overwhelm my own work. So I would say that no, it was not successful. It was too ambitious considering all the problems we already had. But I guess that it can be successful in management team's point of view, if they get added value from the real-time data from production." (R8)

The more divided perspectives the project's success surfaced, were more neutral and considered learnings and other gains, rather than the hard metrics and KPIs set for the project. To characterize the responses, they can be summarized so that the perception of project's success is perspective-dependent.

"That is an interesting question, depends on what you compare it against. If you look at the original timeline and schedule, then it was not successful. If you look at it through costs, then it was not successful. But if you reflect on the learning journey then, I don't know what kind of project would have made us go through anything similar than what this project did. – I would say that hard metrics aside, we did stay on the positive side of things." (R3)

"This is a good question and it depends on the perspective, but given the circumstances our project team has done a incredible work. – I told them that they've done good job with what they had, so this is a great result." (R7)

"A diplomatic answer, that MES is now in use in production. -- I do trust that. we will get a functioning system out of this, but it still requires some work." (R5)

To summarize, Table 1 below summarizes the different perceptions and the reasoning how respondents describe the project outcomes.

Table 2. Respondents' perception on implementation project success

Perspective's viewpoint	Primary reasoning
Success	<ul style="list-style-type: none"> • Achieving real-time data automation • Cleaning ERP data • Simplifying reporting for factory floor operators
Failure	<ul style="list-style-type: none"> • Missing budget and schedule targets • Increasing administrative workload for office staff • Launching an unfinished system
Organizational gain	<ul style="list-style-type: none"> • The project was a "hard school" that significantly increased organizational competence and process awareness

4.3 Analysis of findings

As discovered in the interviews, many economic and structural decisions significantly challenged the project. The economic inertia can be found to derive from initial decisions made prior to implementation project start: here the system and project MVP scope was decided for the implementation as well as the schedule for implementation. From this basis, project structure was determined, according to which the personnel resourcing was done by local leadership in Finland. Cognitive inertia was first found to emerge and shape the decision-making in resource planning phase, where project team overestimated their own understanding of business processes effected by the transformation as well as underestimated the complexity of the technology implementation project: these are found as mental models' effects driven by inertia (Tripsas & Gavetti, 2000;

Haskamp et al., 2021). Interestingly, IT personnel was not considered as necessary resource to be involved in the implementation in the beginning, and thus, not resourced to project originally: this decision was found to surface ambiguity and issues with technical-nature challenges that later emerged. This decision can be rooted to discussions and recommendations by implementing partner's recommendation to prioritize operations-led rather than IT led implementation. Lacking IT presence and resource in the project, thus, contributed to rising structural inertia later in the implementation phase. This supports literature's arguments, that fostering close cooperation is essential in digital transformation initiatives between business and IT functions (Bharadwaj et al., 2013; Montasser et al., 2023; Huang et al., 2023). Furthermore, initial scoping of the project ultimately left little maneuverability for additional resources to be utilized in the project, and together with structural rising structural inertia, gaining additional resources was slowed down the project progression.

Considering project team and management structure during the implementation project, Case Company applied a dual-governance model to drive effective local project execution and supporting management resources and group representation by steering committee. This structurization respondents described to appear as slowing decision-making and receiving support or resources from steering committee, and rivaling internal IT projects prioritizing IT resources elsewhere, thus emerging structural challenges and hindering factors to implementation project. These factors can be found to constitute as structural inertia (Haskamp et al., 2021). Combined with economic inertia, structural inertia appeared as decreased resource fluidity (Doz & Kosonen, 2008), and hindered project team from receiving additional resources allocated for the implementation. Project structurization further caused ambiguity as described missing or receiving insufficient support from steering committee, that was described to be too distant from the operative implementation work. IT resources were eventually partly allocated to both project team and steering committee. Furthermore, the structural inertia created ambiguity supported by cognitive inertia, which appeared as growing frustration and stress among project participants, further interacted by extreme time

pressure caused by implementation schedule, that derives from economic decisions prior to implementation.

Socio-technical and cognitive inertia interplayed together as individuals' skepticism for new system implementation, as previous workarounds had been optimized and well-established over time. On leadership level, cognitive inertia affected project resourcing through existing mental models that resulted in overestimating project organization's knowledge on existing processes and underestimating the capabilities and resources the project's technical nature required (Tripsas & Gavetti, 2000, Haskamp et al., 2021), this is also identified in literature as biased decision-making (Tripsas & Gavetti, 2000). Socio-technical inertia were found to have little to none effect on project outcomes. Cognitive inertia, in comparison, relatively affected structural and resourcing decisions in the early stages of the project, as leadership's mental simultaneously underestimated the complexity of the implementation project and overestimated their own knowledge on their business processes.

Cultural inertia, defined to emerged from the change to routines (Haskamp et al., 2021), was observed coinciding with socio-technical and cognitive inertia. Respondents' description of attitudes towards the MES implementation were divided and clear distinctions could be made on the level respondents worked in: among operative level office staff, the attitudes were skeptical and negative. The respondents described the pre-existing process to be working well, a well-established and documented process which was consistently optimized throughout the years, despite the frequent errors that occurred due to manual data inputs. Frustration peaked among operative and middle management level towards challenging these routines and routinized process. Additionally, the MES was not initially considered as a positive news due to underlining data quality and reporting issues, thus the new technology had not gained internal legitimacy (AlNuaimi et al., 2022). In general, Case Company's culture was the main deciding factor to conduct the implementation project in Finland. The culture was described as problem-solving, committed and genuinely development oriented where

improvements are made consistently. These were considerable strengths, combined with the operations' comparatively straight-forwardness, Finland was a clear choice for the project. Despite these strength factors, interacting with economic, structural and cognitive inertia, the cultural strengths were decreased by ambiguity deriving from unclear responsibilities, and missing support resources and extreme time pressure. These emerged cognitive fatigue (Vial, 2019), that further manifested as demotivation and reverting from proactive to reactive work in the project. However, once the implementation project progressed to testing phase, the working moved to "big room" working. Here, the entire project team worked on testing the solution together. This big room working helped to alleviate cognitive fatigue by increasing awareness of the entire business process the MES would cover across all process phases. Vial (2019: 130) found, "that workshops that involve organizational actors who will be affected by digital transformation can help prevent resistance and improve cross-functional collaboration". This is supported by the study's findings. Economic inertia was observed to slow down the testing as the project faced licensing issues, and prolonged approval process wasted time, and supported by cognitive inertia increased frustration of middle management together with increasing time pressure. However, the collective testing together increased project teams' awareness on the entire business process, which was found to alleviate cognitive and cultural inertia through participatory working model during the testing.

Relating to the second research question, Table 2, summarizes and illustrates the organizational-level and individual-level inertia findings during different phases of the implementation project, how they manifested, and what level personnel experienced that inertia.

Table 3. The manifestation of inertia during implementation project

Inertia	When inertia appeared	Who experienced	How it occurred
Economic	Planning phase	Leadership	• Extreme time pressure
	Project scoping	Middle Management	• Strict MVP scope

	Implementation Testing	Operative level	<ul style="list-style-type: none"> • Low maneuverability
Structural	Implementation Testing	Middle Management Operative level	<ul style="list-style-type: none"> • Decision bottlenecks • Ambiguity • Resource competition
Cultural	Implementation Testing User trainings	Middle Management Operative level	<ul style="list-style-type: none"> • Frustration towards changing routines • Communication challenges with partner • Resistance to tight schedule in user training
Socio-technical	In all phases	Middle Management Operative level	<ul style="list-style-type: none"> • Individual resistance and frustration to increased workload in middle management and operative level (office) staff • Skepticism and negativity
Cognitive	Project planning	Leadership	<ul style="list-style-type: none"> • General technology resistance • Under & overestimation towards required project resourcing • Information fatigue

Dynamic capability and strategic agility theories, as presented in literatures review, are considered as primary enabling mechanisms in transformation (Teece, 2007). The effectiveness of company's ability to sense threat or opportunities, seize opportunities or transform, or reconfigure, their resources to support transformation imitative become critical aspects to ensure successful digital transformation (Doz & Kosonen, 2008; Teece, 2007). In this context, Case Company was seen to leverage their internal capabilities sensing threats: ERP and MES integration work revealed upcoming technical issues, to which the project team was able to proactively focus efforts rethink details and flow of processes during the implementation, thus sense challenges or threats to the project. The project team was able to anticipate and proactively solve these issues before them causing further challenges to the project. Resource fluidity, or the ability to reconfigure resources to support the project, was limited in early phases of the project due to initial economic and structural decisions (Doz, 2019; Haskamp et al., 2021). Pressure that ensued from these decisions, helped project team to leverage and request additional

resources for the project, which ultimately sped up the implementation and alleviated ambiguity significantly when IT resources were involved.

As Vial (2019) noted about participation and involvement of organizational members to transformation, project team applied similar strategy during the testing phase. The strategy to include project team members to a “big room” workshop to conduct testing simultaneously, had greatly positive effects on individuals’ motivation and commitment: cross-functional inclusion and participation promoted clarity among respondents’ understanding of the entire new business process and operating model as each task and employee role were exemplified during testing. Also, resistance to changing routines was mitigated. Despite challenges related to resource rigidity, slowed decision making and wasted time, collective commitment, active participation and inclusion of all project team members to testing, helped turn cultural inertia and resistance to a positive enabling force (Haskamp et al., 2021).

Considering these findings from organizational agility stand point, they showcase that the pilot organization’s strengths and perseverance in the implementation project derived from workforce agility and adaptability (Gong & Ribiere, 2023). The project team was observed to show adaptability when identifying and escalating project issues to relevant team members and stakeholders, and effectively delegating tasks to ensure effective local resource utilization despite resource challenges and competition, and uncertainty. These escalation project-operational decisions showed also as flexibility to tolerate increasing time pressure amidst challenges (Gong & Ribiere, 2023). Adaptability manifested among individuals and on project team-level as proactivity and commitment to solve problems and compensating emerged resource challenges, making it an organizational agility factor (Gong & Ribiere, 2023).

Considering enabling and hindering factors of inertia to the transformation project, the findings showed economic and structural inertia related factors affecting most prominently to outcomes and perception of success in the project. Economic and

structural inertia derived from initial project planning and specifications before implementation, insufficient resourcing and structuring of the project organization. Cognitive inertia emerged individual-level elements, such as mental model's effects, during project resource estimation that further reinforced economical and structural inertia during the implementation (Tripsas & Gavetti, 2000). These inertias further manifested as resource rivalry with competing group-level technology projects, extreme time pressure and due to slowed decision-making capability. Combined, these factors caused stress and, fatigue skepticism and negativity among project participants. Thus, economical, structural and cognitive inertia can be found to hinder the transformation project's success.

Socio-technical inertia occurred in initial stages of the implementation project. Closely tied with cognitive inertia, the inertia emerged skepticism and questioning towards the necessity of new technology. On the background, it was found that these attitudes derived from pre-existing data quality issues, that were consistently improved and optimized throughout the years before MES. However, the effects and manifestation of socio-technical inertia were limited, and did not affect the implementation project. Based on the findings, it can be concluded that socio-technical inertia's effects were neutral.

Cultural inertia occurred in the initial stages of the implementation projects as resistance to the changing routines and way of working among the operative level and middle management level respondents. Closely relating to socio-technical form of inertia, the resistance and frustration, and the ambiguity that followed, affected and lowered individuals' motivation and buy-in for the project initially. The pre-existing routines represented stability in the previous operating model that had been continuously improved and optimized over time, becoming a standard way of operating. When MES was introduced, it revealed a misalignment between old and new operating logic. The misalignment was strengthened by respondents' mental models, representing cognitive inertia (Haskamp et al., 2021) appearance together with cultural inertia. These hindering

effects, however, were not found to directly affect the implementation of MES. However, the same routinized ways of working, transformed to enabling factor towards the end of the implementation project. This was observed to happen via paradoxical duality (Haskamp et al., 2021) during the testing phase of the implementation. The testing was conducted via “big room” working, where all project team members worked together. This collective participation increased awareness of the new process logic and routines, and illustrated the work tasks’ interdependence in the new model. Increased awareness mitigated previous ambiguity and uncertainty among the respondents. These phenomena can be found to derive from organization’s agility, internal dynamic capabilities, cultural characteristics and collective commitment (Teece, 2007; Doz & Kosonen, 2008; Doz, 2019). Together, these capabilities transformed cultural inertia from initially hindering to an enabling factor.

Based on the responses, Table 3 below summarizes and illustrates organizational inertias’ enabling or hindering influence on digital transformation’s success, and what the core findings in each inertia dimension were.

Table 4. Summary of inertia’s enabling and hindering effect in digital transformation

	Inertia	Effect	Core findings
Research question 3 Why does organizational inertia enable or hinder the success of digital transformation?	Economic	Hindering	<ul style="list-style-type: none"> • Economic inertia caused resource rigidity and limited implementation scope which led to additional expenses and work
	Structural	Hindering	<ul style="list-style-type: none"> • Slowed decision making capability • Rivaling priorities hindered resource availability
	Cultural	Enabling	<ul style="list-style-type: none"> • Cultural inertia was not found to hinder the success of transformation • Ingrained mindset to problem solving and developing-orientation of organization supported the project team’s progression through participation and
	Socio-technical	Neutral	<ul style="list-style-type: none"> • Skepticism and questioning necessity towards new system • Frequent data quality errors and issues before MES undermined organization members’ trust towards MES

	Cognitive	Hindering	<ul style="list-style-type: none"> • Limited understanding of entire process and information flow • Mental models' effects on project resourcing
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To summarize, the project's success was found to depend on the perspective how one views the project as a whole. Among the operative and middle management level respondents, the perception of project's success was negative. The resourcing issues, rigidity in project structure and time pressure caused too much pressure and ambitions to complete the project as intended. The MES implementation was described to have caused and shifted additional manual work to office staff employees. In middle management and above, the respondents found that simply going live with MES constituted as a success due to the extreme pressure and stress the implementation project had created. As noted earlier in the section, hard metrics were not met, and the project team faced a massive learning curve balancing between learning and implementing a new technology, battling with project personnel resourcing and challenges that arose from series of economical and structural decisions to organize the project. Furthermore, the project was described to have achieved its basic functional goal as MES was launched, but critical modules were left out and necessitated unnecessary workarounds to compensate those gaps. The overwhelming time pressure caused challenges and hindered the efficiency of system testing in the end of the implementation, which resulted in technical debt and continuing development for the local project team after go-live.

5 Discussion

This chapter focuses on discussing findings and examining what does the findings mean in light of the existing theory, and how do they contribute beyond what the literature already knows about organizational inertia in digital transformation. In order to answer the main research question, the manifestations and interaction during a digital transformation project is addressed first (RQ 2). Next, the enabling and hindering effects of organizational inertia to the success of the transformation is discussed (RQ 3). Finally, discussion builds up to answering the main research question, how does organizational inertia shape the implementation and outcomes of a digital transformation project (RQ 1).

Following the discussion of findings, this chapter continues with theoretical and practical implications describing the contributions to literature and considerations for organizations embarking on a digital transformation. Furthermore, limitations of this study are discussed.

Case Company set out concrete, yet ambitious goals for their MES implementation project. The simplified goal was to abandon manually conducted data collection and entry tasks, and shift to automated data collection and real-time reporting. Ultimately, through this automation and process improvements were designed to increase accuracy and data quality in reporting and management's decision making. The data would flow directly from their factory machinery with simplified end-user inputs. Despite clear outcome goals for MES, the project faced a multitude of challenges throughout the implementation project ranging from ambiguity and unawareness of project's and technology's specifications and capabilities, strict project-scoping and personnel resourcing issues cumulating to an extreme time pressure. These challenges were surfaced by interaction and coexistence of different organizational and individual-level inertias during the implementation project. Regardless of voiced concerns, ambiguity of goals and capabilities, the MES was launched unfinished to maintain the project's ambitious schedule.

The findings demonstrated interplays and dependencies between organizational and individual-level inertia in the case study. Starting from the drivers for digital transformation, it was observed that the main drivers for this technology transformation were internal. The project was enabled by managerial buy-in for MES project which occurred when higher level manager in the group organization was familiar and experienced from MES. This led to founding a project team to plan and scope the requirements for MES.

Economic and structural inertia arose from underlying economic and scoping decisions made to enable the project (Haskamp et al., 2021), and the project organization structure created for it. These inertias constrained the project's progression through resource rigidity, ambiguity and added managerial layer for requesting and approving additional resources (Doz & Kosonen 2008). Here, economical and structural inertias can be seen to interact and reinforce one another, and constrain the project outcome through delays and resistance, ultimately leading to missing project targets.

Cognitive and socio-technical inertia were found to closely related to one another, as initial skepticism and negativity rose from questioning the need for a new technology, change of processes and routines to well-established and documented operating model (Haskamp et al., 2021). Thus, cognitive and socio-technical inertia can be seen to have mutually reinforced each other. Moreover, cognitive inertia were found to have affected with initial project organizing decisions: mental models of local and project leadership led to underestimating project complexity, and overestimating own process understanding, contributing to resourcing decisions and challenges with technical aspects of the implementation project (Tripsas & Gavetti, 2000). Thus, interaction and mutually reinforcing effects between cognitive and economical inertia, as well as cognitive and structural inertia were demonstrated to occur. Cognitive inertia was also seen to have an reinforcing effect to structural and economical inertia, and a constraining influence to cultural aspects and inertia: extreme time pressure throughout the

implementation project caused unclear expectations and responsibilities, information fatigue and decreased motivation and commitment of project team members.

Cultural inertia was found to derive from the routines and identity that were challenged in the implementation project (Doz & Kosnen, 2008; Doz, 2019). Closely connected with cognitive and socio-technical inertia, the cultural inertia manifested as frustration to changing pre-existing, stable and consistently optimized routines in data collection and reporting. However, these inertial forces were found to vary depending on the work level. The same aspects were not discovered on middle management or leadership levels, based on which can be drawn that the legitimacy (AlNuaimi et al., 2022), or justification, for the MES was stronger in higher levels of the organization that are more likely to benefit more from MES. In other words, the cultural inertia manifested differently depending on how involved the respondents were and with what part of the process the MES would change operating model, suggesting that the legitimacy for the transformation project was stronger in middle management and leadership levels (AlNuaimi et al., 2022).

Cultural inertia manifested initially as skepticism and negativity towards the implementation, and as project progressed it shifted to frustration. Furthermore, cultural inertia was found to emerge from Case Company's identity (Doz & Kosonen, 2008; Doz, 2019), when local and project leadership described them to identify more as operational rather than project organization. These observations constitutes as constraining factors towards the transformation project.

The case study observed paradoxical duality in practice, or, how cultural inertia's initially constraining elements were turned to enabling forces. (Haskamp et al., 2021). This was manifested in projects' testing phase, when project participants were included to testing across all levels and functions. By applying and enforcing this participation strategy in the project with active managerial presence, Case Company was observed to utilize adaptive leadership practices fostering a experimenting culture (Doz & Kosonen, 2008).

As a result, inertial effects of the culture were mitigated through cultural drivers, organizational agility and strategic agility: these capabilities increased big-picture and strategic awareness of project participants, fostered experimenting culture and collective participation, and transparency through active managerial presence and actions (Doz & Kosonen, 2008). Incorporating and utilizing these capabilities both consciously and unconsciously, the routine-based cultural inertia shifted to support the new logic of work. Project team's persistence, problem-solving mindset and development-orientation re-emerged and increased commitment towards the launch of the new technology. Thus, this shift turned the inertial force's initial hindering effects to enabling effects (Haskamp et al., 2021; Huang et al., 2023).

Considering elements described in literature review that contribute to digital transformation outcomes, the case study was found to suffer from strategy-execution gap, confirming the negative influence to the outcome of a digital transformation (Correani et al., 2020). Presence and utilization of a specific strategy for executing the MES implementation project was not identified during the interviews, however a connection to such strategy can be made with initial project planning and planned expansion of MES after pilot project. Based on findings, missing of a clear strategy for executing the MES implementation was found to have a constraining influence on the project and its partial transformation outcome.

Based on the findings and analysis, a revised theoretical framework (Figure 3) was built to illustrate the discovered inertia during the implementation project, inertia relationships and interdependence as they appeared in the single case study and as described in the discussion. The framework shows the identified and utilized dynamic capabilities and forms of organizational agility applied in the project. Following the logic of the theoretical framework (Figure 2), the top of the figure describes the drivers for digital transformation project. The left side of the framework depicts the dimensions and manifestations of organizational and individual-level inertia during the transformation project, and their nature and effect on the implementation project. The arrows describe

the influence and dependence of inertia between one another. Inertia's connections to transformation project in the middle describes the inertia's enabling or hindering effects. The right side of the figure shows identified and utilized dynamic capabilities and forms of strategic agility, as observed in the implementation project, describes their nature and effect to transformation project. Furthermore, strategy-execution gap is described as its own constraining factor towards implementation project. Through these connections and dependencies, the project achieved partial transformation.

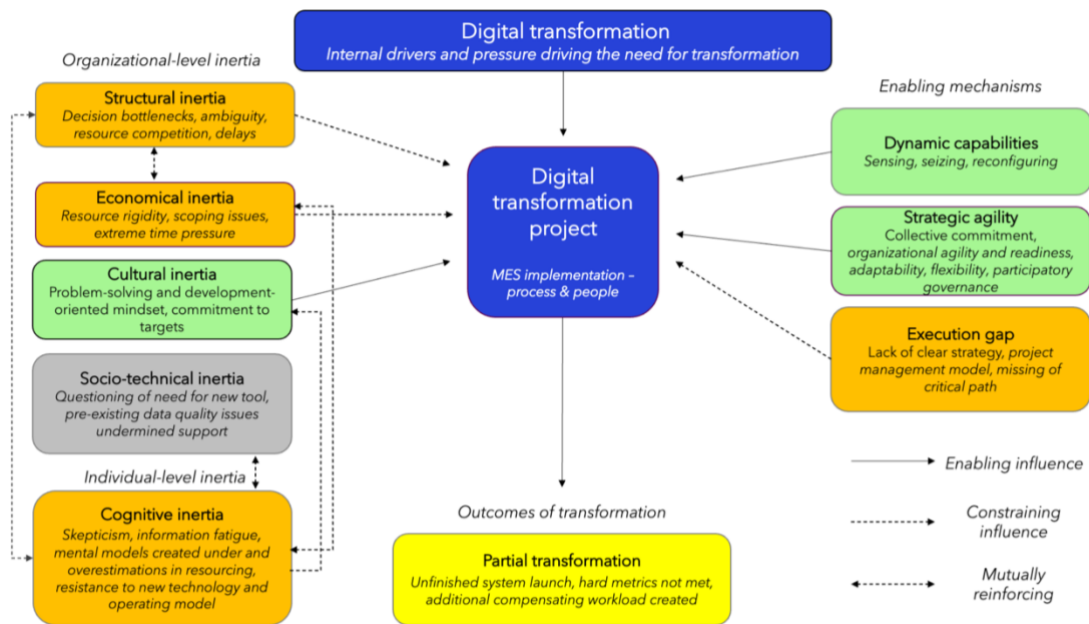


Figure 3. Theoretical framework based on synthesis of findings

To conclude with the main research question, organizational- and individual-level inertias shape the implementation and outcomes of a digital transformation project through coexistence and mutually reinforcing effects. Inertia can exist in many levels and cause a variety of interrelated challenges and resistance. Through mutually reinforcing effects, the inertial forces can grow and magnify underlining issues that threaten the intended change. In the empirical case, first forms of inertia stated to actualize through strategy-execution gap and resulting misalignment within the implementing project team. Misalignment forced Case Company to a reactive position limiting their dynamic capabilities to anticipate challenges or strategic shifts, which lead to slowed and hectic decision-making. This chain of decisions caused significant uncertainty, pressure and

related challenges to the implementation. The multifaceted forms of inertia constrained project's sufficient resourcing and delayed the execution despite best efforts affecting the outcome of the project. The implementation project was ultimately found to have achieved minimum requirements, but necessitated workarounds and caused extra workload to some work areas. Based on these elements, the project resulted in partial transformation.

5.1 Theoretical implications

This thesis contributes to digital transformation and organizational inertia literature by studying appearance and effects of organizational inertia in a practical real-world case study. More specifically, the research in this thesis focused on identifying what forms of inertia and when in the implementation project they occur, how they interact and contribute to shaping the execution of digital transformation initiative and outcomes of it.

Through empirical case study different forms of organizational inertia were successfully identified. Additionally, findings provided practical examples how those inertia manifested and interacted throughout the implementation project, ultimately showcasing inertia's interplay's effect on digital transformation outcome. Thus, case study succeeded to answer set research questions.

The findings of the case study produced a new revised theoretical framework which illustrates the aforementioned relationships, occurrence and effects of different organizational inertia to a digital transformation project's outcomes in case study's context. Furthermore, the revised framework illustrates the effects of applied dynamic capabilities to transformation project.

As a single-case study, the results are not generalizable, but they challenged the generally described nature of inertia as a hindering factor (Haskamp et al., 2021), by uncovering the enabling effect of cultural inertia towards implementation project

success further supported by organization's dynamic capabilities. Cultural inertia was found to contribute to implementation's success through paradoxical duality, serving as both hindering and enabling factor during the transformation (Haskamp et al., 2021). Cultural inertia's negative effects and impact described in the literature manifested partially. The working culture and self-reliance of project team increased commitment and motivation among project team and contributed to project's implementation positively. Additionally, the case study proposed a new revised theoretical framework how organizational inertia manifest and shape the outcome of a digital transformation project.

5.2 Practical implications

The results have several practical implications for management and leadership levels as they plan digital transformation. While to conclusions are grounded to a single case, the inertial dynamics that were observed and their interaction between organization's dynamic capabilities, reflects challenges that are well recognizable in digital transformation literature and practice (Vial, 2019; Haskamp et al., 2021). First and foremost, organization must define a clear digital strategy before the implementation begins (Bharadwaj et al., 2013). In the case project, the absence of a shared and clear strategy created conditions where inertia emerged and could strengthen throughout the project phases. It was observed that when employees cannot connect their project involvement to a clear strategy and rationale for the transformation, cognitive and cultural inertia emerges to slow down the change.

Second, decision-making structures and mandates need to be clearly defined and enforceable: one of the most consequential contributors to the execution gap was ambiguity about who holds the authority at critical project phases (Correani et al., 2020; Haskamp et al., 2023). This observation calls for explicit decision-making mandate before the implementation project begins to ensure that the project team can operate without escalating requests and approvals through added management structures.

Third, consistent with literature findings, participatory governance structures represent one of the most effective mechanisms for mitigating cognitive and cultural inertia during digital transformation (Haskamp et al., 2021). In practice, this means involving affected employees actively in shaping and planning the transformation.

Finally, the study suggests that the role of consistent and visible managerial actions are crucial for the transformation success. The study found, that when management engaged consistently and communicated transparently in the project, inertia and resistance were visibly reduced. Vice versa, where managerial presence and actions were ambiguous, inertia emerged. Therefore, managerial actions should be considered as a structural force for transformation success. Furthermore, literature underscores the importance of alignment between a clear digital strategy and execution plan (Correani et al., 2020). The findings suggest, that the strategy for digital transformation should consider the forms inertia potentially affecting the transformation initiative. As the case study shows, different forms of organizational inertia appear in different phases during a transformation project. The context and extent in which these inertia may emerge, depends on the involvement and transparency of the project team to planning stages of the project. Involvement and participation fosters cross-functional alignment and increases awareness. Through awareness, project organization is better equipped to address and alleviate inertia from triggering challenges or resistance during a transformation project.

5.3 Future research

This study examined overarching effects on how organizational inertia shape implementation and the outcomes of a digital transformation project. The research included organizational inertia as an affecting element to digital transformation, and dynamic capability and strategic agility theories as enablers to digital transformation project. The findings revealed practical effects of managerial actions during the implementation project, but were not examined in detail. The findings suggest, that alignment between managerial actions and management structures during a

transformation are crucial for fostering transparency and prevent inertia from emerging. Therefore, managerial actions' contribution to digital transformation success should be further studied.

An unexplored aspect of dynamic capabilities in this study was organizational learning. Organizational learning represents a crucial component in identifying and leveraging dynamic capabilities to enable digital transformation. Organizational learning is considered a critical capability for organizations to improve their adaptability and sensing upcoming threats, opportunities or strategic shifts (Teece, 2007). The organizational learning was briefly touched upon in this case's interviews, but not further analyzed in the findings. Organizational learning's effects to organizational- or individual-level inertia as a dynamic capability, and its effects as an enabling force during a transformation, constitute an interesting future research topic.

Considering limitations of the study, the primary limitation of this research concerns the scope or boundaries of its single-case design. The findings of the research are based on one technology implementation project within one organization. Furthermore, utilizing qualitative approach the research focuses on analytical and in-depth research on understanding complex phenomena, rather than statistical generalizable results. The single-case design provided rich context to examine the how inertia manifests across organizational and individual levels within a live project. Furthermore, sample group of eight participants involved in the thesis' qualitative research poses another limitation. These participants worked in operative, middle management and leadership levels and functions within the pilot-organization which limits the findings to sample only participants', not necessarily the entire organization's perspectives.

Lastly, the findings were analyzed by interpreting the data, meaning that another researcher might conclude and categorize results differently even though working with same data set.

5.4 Declaration of artificial intelligence tool use

This thesis has used NotebookLM artificial intelligence tool to aid during theoretical review phase of this study. Its use was limited to reviewing and synthesizing theoretical concepts after the literature was initially independently read by the author. All theoretical sources referenced in this thesis were first read and engaged with directly by the author. NotebookLM was not used at any stage of the empirical data analysis or generating results. The identification of themes, patterns and conclusions were drawn from the interview data and represent the author's own independent analytical work.

The author takes full responsibility for the academic integrity of this work and confirms that all ideas, arguments and conclusions presented are their own, supported by the sources cited.

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Appendices

Appendix 1. Interview questions

1. Describe your role and participation in MES implementation
2. How was work and done before MES implementation? What kind of challenges were involved?
3. How would you describe organization's attitudes towards change before the implementation project?
4. When was the project started? How was resources and responsibilities decided, and why?
5. How did leadership and management participate to the project in practice?
6. How did the project progress? How did the organization react to changes, and way it reacted the way it did?
7. How were learnings and knowledge shared during the project?
8. What was learned during the project? Did people's ways of working changes?
9. How is MES used today compared to project's initial goals? Are there any differences between project's goals for use and the practice, and if so, where did the differences emerge?
10. Was project successful or not? What were the deciding factors?