Culture, Structure, and Disaster: DSB

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Abstract

This project examines the efficacy of DSB's technostructure as it relates to culture and structure in the face of challenges related to changing DSB's core fleet of intercity trains from diesel to electric (IC5). Megaprojects such as this one carry severe implications for budget, time, and utility, as can be seen from the past two decades of research in this field, spearheaded by Bent Flyvbjerg and his associates. With a theoretical foundation in Schein's model of culture and Mintzberg's model of organizational structure, a qualitative analysis of interviews, available reports, and literature was conducted. The report proposes that DSB's leadership should consider structural and cultural changes to the technostructure, which was found to be somewhat isolated and fragmented, both culturally and structurally. These changes could help to mitigate the unfavourable outcomes of the IC5 project for the organization as a whole as they emerge in the following years.

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1. Introduction

Nowadays, a rapid development of various technologies is evident. Therefore, different organizations and companies face the necessity to be increasingly adaptive to stay efficient, keep up with the technological process, and be able to effectively utilize the relevant innovations. However, the introduction of technological advancements within a company may potentially lead to complications and issues associated with different factors. Danske Statsbaner, which is a company that runs almost all passenger trains in Denmark and is therefore required to keep all the associated systems up to date is often criticized for poor service and high prices, despite being a national company and seemingly having a monopoly on all the railway related aspects within Denmark.

DSB (Danske Statsbaner) is an independent, national railway company in Denmark, owned by the Danish government. DSB is the largest provider of rail passenger transport in Denmark with 448.000 daily passengers in 2022. DSB operates around 500 trains between almost 200 stations and has roughly 6.100 employees. The DSB headquarters is located in Taastrup (Danske Statsbaner, 2022). The s-train network in Copenhagen accounts for roughly 60 percent of DSB's daily passengers, and long-distance and regional trains account for the remaining 40 percent. Since its founding in the 19th century DSB has variably operated railways, passenger trains, cargo trains, buses, ferries, and infrastructure construction companies, until the 1990's where the company took its current form with the division of the rail network and the rolling stock. Currently DSB owns and runs the rolling stock and the stations on the rail network for passenger transport, but not the railroads and signal systems themselves, these are operated by the state operated Banedanmark (Danske Statsbaner, 2022).

There have been emerging problems that DSB had to face throughout the recent past. Delays and cancelations that negatively affect the company's image among the target customers, issues within management since in a five-year period, between 2010 and 2015, DSB changed CEO seven times and the infamous case of implementing the IC4 trains are the most well-known examples (Barrow K. 2018) that may indicate struggles within a company, especially with the efficient introduction of relevant technical innovations.

Therefore, in this project we want to analyse DSB as a company, gain an insight into its organization and internal culture to define how it approaches the implementation of new technological advancements. To achieve that, it is necessary to gather information about the company first. For that we use the McKinsey 7S model as a tool to define the organizational design of DSB, sort the relevant information and underline other factors affecting the company.

2. DSB company description

2.1. Model

The McKinsey 7S model is a management tool developed by consulting firm McKinsey & Company that helps analyse and align various internal elements of an organization to ensure its success. The model emphasizes seven interconnected factors that need to be aligned and reinforced to achieve organizational effectiveness. The McKinsey 7S model is beneficial to assess, understand, and manage the complex interrelationships between various internal aspects of an organization. It offers a structured framework for analysis and helps in making informed decisions to improve organizational effectiveness and performance. The first three "hard" elements of the model being structure, strategy, and systems, are influenced by the company's management, while "soft Ss" such as skills, style, staff and shared values are mostly affected by corporate culture. (Peters, T. J., & Waterman, R. H., 1982). Overall, the model focuses on organizational culture and how it impacts performance, aiding in cultural change or integration efforts and helps in diagnosing organizational problems or inefficiencies by analysing how well the seven elements are aligned, which is particularly useful for this project.

2.2. Structure

Structure includes the organizational hierarchy, roles, responsibilities, and reporting lines. It encompasses how the organization is divided, departments, and how teams collaborate. The official organizational chart and the information from the official sources depict it below.

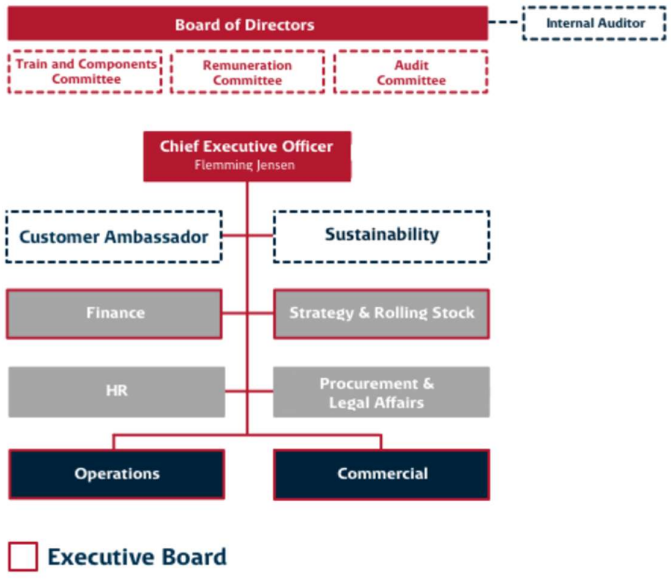

Figure 1 - Danske Statsbaner (n.d.-a)

DSB has been an independent public corporation since 1 January 1999. It entirely owned by the Danish Ministry of Transport. DSB provides urban, intercity, regional, and international passenger rail services within Denmark, and across international borders, in particular into Sweden (Danske Statsbaner, 2022). Since DSB is a state-owned public company, The Ministry of Transport is represented as a sole shareholder and has the corresponding powers.

The company is managed and run by a board of directors and an executive board. The board of directors is responsible for DSB's day-to-day management, including that the bookkeeping takes place in compliance with the relevant legislation and that asset management is carried out in a reassuring manner. It consists of 9 members, of which 6 members are elected at the company meeting by the Ministry of Transport and Housing and 3 are employee-elected members. The board members elected at the company meeting are considered to be independent and are elected for a period of two years.

The audit committee assists the board with an independent assessment of whether the company's financial reporting, internal controls, risk management and statutory audits are organized in an appropriate manner in view of the size and complexity of the company and the group. The remuneration committee assists the board in preparing recommendations regarding remuneration policy and remuneration. The rolling stock committee assists the board in preparing recommendations regarding acquisitions, investments, and sales of rolling stock.

The next link in DSB’s company structure is its CEO a position currently occupied by Flemming Jensen (Danske Statsbaner, 2023) who manages the overall operations of the company, setts a strategic course, fosters an efficient organizational culture, and ensures the effective execution of plans and initiatives. CEO also oversees the work of big departments.

One of such is the customer ambassador department which mainly processes the received feedback such as complaints, company improvement propositions, etc. and makes sure that the information gets to the higher management. Another department is sustainability, which oversees initiatives that promote environmental, social, and economic sustainability. The finance department controls financial resources, ensuring fiscal responsibility, and supporting strategic decision-making within DSB. Strategy and Rolling stock play an integral role in ensuring the overall success and competitiveness of the transportation or railway organization. The Strategy aspect focuses on long-term planning, market positioning, and strategic growth, while the Rolling Stock concentrates on the effective management, maintenance, and technological advancement of the essential rolling stock assets. Collaboration between the two is crucial to align strategies with operational needs and market demands. The Human Resources (HR) department functions as a crucial link between an

organization and its employees, overseeing various facets of managing personnel and fostering a positive work environment. Procurement and legal affairs department is responsible for managing risk, ensuring legal compliance, and securing essential resources for the organization. The Operations department ensures the efficient and safe operation of train services and related infrastructure provided by DSB. The Commercial department primarily oversees revenue generation and marketing (Danske Statsbaner, n.d.-d).

Overall, DSB is undoubtfully a large company and thus the company structure listed above is general and only covers the biggest aspects of the company. However, it is possible to claim that the public official organizational chart is incomplete as it does not represent such major parts of the company as the IT department.

2.3. Strategy

Strategy entails an organization's plan for achieving its goals and objectives. It involves defining direction, scope, and approach that are pursued by the organization, while also making sure to remain competitive in its industry.

DSB Group is a railway company that offers passenger transportation services on a commercial basis as well as other services related to railway operations. DSB is Denmark's largest provider of passenger transport services and has a long tradition within rail transport, having operated railway services in Denmark since its foundation in 1885. DSB provides long-distance and regional train services, as well as S-train services which represent public transport in the Greater Copenhagen area through its division DSB S-train. It is important to highlight that DSB is not solely responsible for the entire railway system. The Rail Net Denmark ("Banedanmark") provides the infrastructure such as tracks, power supply and signalling systems. The responsibility for infrastructure and related activities is vested in Banedanmark, which was separated from DSB in 1997 and is fully owned by the Danish State (Danske Statsbaner, 2022). Therefore, DSB needs to work closely with Banedanmark to facilitate the train operations as efficiently as possible.

DSB's goals are cantered around optimizing the Danish train operating systems, which is vital for their future as a more sustainable and reliable company. They aim to discard all their diesel and petrol driven trains by 2030 and thereby make the train operation CO2 neutral (Danske Statsbaner, 2022). So far, DSB has reduced their combined CO2 admission by 8% in 2022, with the overall reduction of CO2 since 2019 which showcases stable progress. To achieve the goal of becoming CO2 neutral, DSB has invested in renewable energy such as solar panels for their stations, workshops, and preparations centres. Furthermore, DSB also invested 20 billion DKK in new modern IC5 electric trains. These trains are set to hit the Danish tracks from mid-2025 from the Italian supplier Alstom.

> *"The new trains are a unique opportunity for DSB and for Denmark. The new trains will make our work at DSB easier and simpler. The new trains will make the journey more attractive for our customers because the trains are more modern, they are faster and more reliable"* -Flemming Jensen (Danske Statsbaner, 2023).

DSB's strategy plan called Markedsorienteret DSB (Market oriented DSB), primarily focuses on three points which are: customer in focus, a competitive and sustainable DSB and the employee culture (Danske Statsbaner, n.d.-d).

DSB is working on meeting the customer's needs, by reducing the waiting time for the trains, as well as reducing the price of each ticket, to make public transport a cheaper solution. It includes working to establish better cohesion between modes of public transport. For DSB the customers' satisfaction and DSB's reputation are of significant importance since DSB is a public company. In order to attract new customers and create growth, DSB is working to improve customer satisfaction. The customers must experience a sustainable and financially effective corporation with a high level of service and a constructive dialogue. As part of the new focus DSB wishes to consolidate and maintain relations with the existing customers and as a minimum maintain customer satisfaction, while at the same time carrying out extensive efficiency enhancements of the corporations. Since DSB is a Danish company, the target customers are Danish residents, tourists, and other visitors, particularly the ones who need to rely on public transport to travel. Other potential customers include German and Swedish residents due to the close proximity of those countries to Denmark, as well as any other people who may transit through using DSB. While DSB has a monopoly on passenger rail between major cities in Denmark they are hardly the only transportation option for consumers. Apart from other train operators, DSB's primary competitors are other means of transport such as cars, buses and airplanes. Denmark is well connected with roads that service private vehicles as well as buses, which have the option of boarding ferries between destinations. Intercity bus routes are cheap, compared to DSB's standard pricing scheme. Flying between cities is also an option. Private vehicles can be a cheap travelling option, depending on passenger count and the type of vehicle. It presumably has the added bonus of bringing passengers all the way to their final destination, while trains often must rely on buses or secondary trains to achieve, expanding travel time substantially. Hence, DSB works to ensure optimum cooperation and effective coordination of traffic in favour of its customers. DSB puts a significant emphasis on customer security, including more guards and increasing surveillance in the trains and stations (Danske Statsbaner, 2023).

As mentioned in DSB's goals, the company aims to neutralize their CO_2 emission completely by the

year 2030, and to have a completely neutral CO2 supply chain by 2050. To increase competitiveness, measures are being implemented to simplify and streamline DSB controlled operations through processes as well as systems. It is particularly relevant for the utilized digital systems such as online ticket booking called “plads 90”, which is a system created in 1990 for DSB and the Norwegian NSB thus being somewhat outdated by modern standards. The replacement will be a standard system, which moves all storage and reservation management into a modern, cloud-based IT system. Enhancing DSB’s competitive power is an important element in ensuring that DSB will continue to be the primary train service operator in fulfilling the Danish government’s ambition of doubling the use of public transportation by 2030 followed by becoming carbon-neutral (Danske Statsbaner, 2022). Efficiency enhancements will also ensure a competitive edge in the competition to obtain new contracts with the Ministry of Transport.

Improving the overall financial efficiency is necessary to strengthen DSB’s competitive power and for DSB to be able to secure the resources required to maintain primary focus on strengthening the positive experience of the customer. In connection with the on-going operations and financing, the corporation is affected by the development and pricing on the financial markets. In overall terms DSB works based on an approved financial strategy which sets out the framework for financial management. Generally, the financial markets have been very unpredictable and DSB makes ongoing adjustments to the changed market conditions. Specifically, DSB aims to ensure liquidity for refinancing, cash flow from operating activities and investments by maintaining a high degree of financial flexibility. It is important for DSB to focus on the risks associated with changing the corporation, including implementing new innovations and processes. Comparing prices between different travel options is not straight-forward, as DSB offers a limited number of tickets at competitive price points on all routes. However, regular tickets are invariably more expensive than bus tickets and the cost of fuel for private vehicles. Another significant advantage for DSB is that train travel is invariably the least environmentally damaging way to travel both medium and long distances, compared to other means of travel (IEA, 2019).

DSB places great emphasis on their working environment. The company would like to develop their employees and the organization's culture, with a focus on a common approach to effective working environment efforts. These frameworks are described in DSB's working environment policy. The physical framework for a better working environment is their approach to the reduction of work-related accidents, and this can be anything from serious work accidents with physical injuries to employees, to threats from external sources. DSB believes that good employee relations are a fundamental prerequisite for delivering a good product to customers. Companies also work with an "APV measurement", which is a workplace assessment, every 3 years. These assessments have given

DSB an insight into dissatisfaction in the workplace. It deals with stress, abusive acts and violence and threats. DSB also works in areas other than the workplace. These areas include a pension scheme for their employees, as well as a senior policy which retains older employees so that they can ensure a smooth transition to retirement.

Overall, DSB claims to put a significant emphasis on customer satisfaction as this factor influences the degree of the company's competitiveness and overall financial success, while also focusing on sustainability and promoting a comfortable workplace environment and culture for its employees.

2.4. Systems

Systems contain processes, procedures, and technical systems that guide how work is done.

Since DSB is a railway company, most of its technical systems cover the operations that have something to do with trains or other relevant procedures such as maintaining the ticket selling, general maintenance of properties owned by DSB. Most of the processes and procedures within the company are defined by the Board of Directors and CEO based on the primary principles of corporate governance such as transparency, accountability, responsibility, fairness, and risk management. In addition, since DSB is a state-owned private company, the Danish government also has a significant influence on DSB's initiatives and policies. DSB's public service transport is largely based on a transport contract entered with the Danish Ministry of Transport. The purpose of the contract is to ensure public transportation at hours and in areas where the commercial foundation for an operator is not sustainable. Therefore, the contract holder has an obligation to ensure public transportation. The basis of DSB's business is primarily the applicable law and other conditions stipulated by the Ministry of Transport. Therefore, the future development is decided by the owner through the specified priorities. DSB's reputation is one factor that can affect the political risk. For many years DSB has focused on railway safety and management of the risks associated with train operation. Variance in customer satisfaction may have an influence on passenger revenue and thereby the financial performance of DSB.

2.5. Skills

The competencies, capabilities, and expertise of the organization's employees. It refers to both technical skills and soft skills necessary for success.

Since DSB is a big company, the range of skills is quite diverse. However, there are the most common and necessary ones. First and foremost is the requirement to respect, acknowledge and inspire fellow colleagues. Professionalism in the relevant field is expected. According to DSB it employs 88 nationalities (Danske Statsbaner, n.d.-c), thus being tolerant is a requirement as well. It translates into some of the departments using English as a working language thus making it a relevant skill,

especially when it comes to interdepartmental collaboration. DSB puts a lot of emphasis on various projects, making task and project management a relevant skill as well.

DSB promotes initiatives that are aimed to increase employees' relevant skills. The most noteworthy example is the DSB's Growth program primarily focusing on such fields as strategy, purpose, sustainability, professional development, inclusion, and diversity (Danske Statsbaner, n.d.-b). As a part of the employee culture strategy, DSB offers various benefits to its employees such as health insurance, access to company exclusive events, and the opportunity to use public transportation for free.

2.6. Style

Leadership and management styles within a company can vary based on the culture, objectives, and operational needs. They reflect the approach and behaviour of leaders in influencing the organizational culture. As DSB is a major state-owned public company the prevalent leadership style is bureaucratic. It emphasizes adherence to established rules, procedures, and protocols within an organization, which constantly occurs within DSB as it must follow the governmental directives as well as the decisions made by the ministry of Transportation. The well-established hierarchical order within the company allows it to maintain order, consistency, and efficiency through a structured and rule-based approach. While bureaucratic leadership style can provide structure and stability to an organization, it can also lead to rigidity, slower decision-making processes, and limited flexibility in adapting to changing environments. However, the leadership styles may vary in different departments. For example, within the IT department the leadership style is highly collaborative and Team-Based due to the interconnectedness between various projects the department is responsible for. Overall, balancing the benefits of structure and order with the need for innovation and adaptability is crucial for success, especially in dynamic industries like the railway sector which is something that DSB pursues to a certain degree.

2.7. Staff

Staff encompasses the organization's workforce in terms of numbers, positions, and skills. DSB has provided jobs for about 6.114 employees throughout Denmark, the majority of which are full-time employees (Danske Statsbaner, 2023). 4.286 full time employees work directly in DSB and the rest work in its subsidiaries: DSB Service & Retail A/S, DSB Vedligehold A/S, and DSB Ejendomsudvikling A/S. There are tendencies to centralize the workforce within one entity, since DSB plans a merger with DSB Vedligehold A/S. As mentioned before, DSB puts towards diversity in its workforce, which is reflected in the gender ratio of employees, most recently in 2022 when a small increase in female management from 30 % to 32 % was observed. Due to the size of the company, there is a great variety of different jobs that the company offers, thus the training and motivation of staff may vary.

There is also a stated, significant focus on allowing the younger employees more freedom to express their ideas and thus strengthen their professionalism (Danske Statsbaner, 2022), which indicates the effort to be more flexible in solving various issues that the company may face.

2.8. Shared Values

The shared values are represented by core values, beliefs, and guiding principles that define the organization's culture which in turn influence behaviour and decisions. DSB's Board of Directors has embraced a social responsibility policy rooted in the company's core values which include safety, environment, sustainability, human rights, anti-discrimination, diversity, and safe working environment. The policy serves as the guiding structure for all individuals within DSB - employees, management, and the Board of Directors - to demonstrate socially responsible conduct and foster respectful interactions among each other, customers, and stakeholders. The Board of Directors oversees the policy, assuming general responsibility and conducting annual evaluations to ensure its effectiveness (Danske Statsbaner, 2022). The social responsibility policy establishes the framework for how DSB can conduct itself responsibly within several key areas. DSB also expects suppliers to align with the company's core values and fulfil the criteria for appropriate conduct. Overall, the social responsibility policy contains the shared values within DSB. Enforcing the policy allows DSB to facilitate a structured and defined working environment. Additionally, DSB's focus on reliability, coherence and punctuality helps support collective responsibility.

3. Problem identification

Nowadays, a rapid development of various technologies is evident. Therefore, different organizations and companies face the necessity to be increasingly adaptive to stay efficient, keep up with the technological process, and be able to effectively utilize the relevant innovations. However, the introduction of technological advancements within a company may potentially lead to complications and issues associated with different factors. Danske Statsbaner, which is a company that runs almost all passenger trains in Denmark and is therefore required to keep all the associated systems up to date is often criticized for poor service and high prices, despite being a national company and seemingly having a monopoly on all the railway related aspects within Denmark.

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4. Methodology

This chapter delineates the methodologies employed in our analysis of DSB. The project uses a mixed-method approach where different theoretical frameworks are used in a qualitative manner ensuring a robust understanding of DSB's organizational structure and cultural dynamics as they get applied to the IT department(s) in the company.

Insights were achieved through an initial qualitative analysis of DSB using the McKinsey 7s model, which was instrumental in getting an overview of DSB's structure. This overview led us to focusing producing a detailed analysis of the IT department. The 7S model aids in categorizing and drawing connections between findings, and it led us to the realization that the software side of DSB is largely unmapped, based on the available sources that we employed through the model.

Central to our analysis are Henry Mintzberg's theory on organizational structure and Edgar Schein's theory of organizational culture and leadership. These frameworks provide a thorough understanding of internal dynamics in any company through different perspectives. In addition, we have relied on Bent Flyvbjerg's Iron Law of Megaprojects as it focusses our understanding of DSB in the context of acquisition of a new fleet of trains. This became necessary as we came to realize,

through our interviews, that the management of this megaproject will define DSB and DSB's technostructure for the foreseeable future.

The statistical certainty and rigor of Bent Flyvbjerg's Iron Law of Megaprojects helped to justify the inclusion of cultural and structural analysis. As the law provided a substantial degree of certainty that DSB would face challenges while undertaking a large project, any theoretical framework for optimizing the organizations efficacy, efficiency, resilience, or bottom line was relevant in this context.

Primary data was mainly sourced from DSB's own comprehensive annual and bi-annual reports, offering information on the company's operational strategies, performance metrics, and organizational changes. This data was crucial in providing an official, documented perspective on DSB's operational framework and its evolution over time. To complement and deepen our understanding, we conducted semi-structured interviews with key members of DSB's IT department. These interviews were instrumental in offering insider viewpoints on the department's specific operational challenges and cultural nuances. In conducting our interviews, we were guided by the methods described in the book '*Interview: introduction til et håndværk*' from 2008, by Kvale and Brinkmann. Additionally, secondary sources, including academic journals and journalistic articles, were used to supplement our primary data, providing a broader context and external perspectives on the railway industry and DSB's positioning within it.

Interviews were qualitatively analysed against our theoretical backdrop to identify recurring themes and patterns. As they were interpreted through Schein, Mintzberg, and Flyvbjerg, the constellation of theories created a nuanced picture despite the limited number of interviews conducted. While these interviews were insightful, the limited set contributes to a large degree of subjectivity and bias. Interviews reflect an individual perspective and without comprehensive studies of multiple sources, limits the strength of our analysis and conclusions.

Our research methodology, while thorough, is not without limitations. The limited set of interviews aside, one significant aspect is our reliance on DSB-produced reports. While these reports have been approved by the Danish National Audit Office (Rigsrevisionen) which adds a solid layer of reliability to the reports, the reports may still present a perspective that chiefly aligns with the organization's internal narrative and viewpoints.

The identities of out interviewees have been kept anonymous, adhering to academic standards in this regard. This was especially crucial in relation to the anecdotal source referenced in the discussion chapter. This source has not been informed of their participation in this research, which is

why no discernible details about the source have been revealed in this project, apart from a limited set of crucial context clues underlining the sources relevance to this project. Subject to ethical considerations and with respect to the lack of agreements made with this source, we are prepared to discuss additional detail about our anecdotal source if required for academic scrutiny and verification – so long as those disclosures do not compromise the anonymity of the individual involved.

In summary, used methodology has given us valuable insights into the cultural and structural aspects, but it is pressing to acknowledge the limitations of the number of interviews conducted. We have mitigated these limitations through a substantial, qualitative, and careful analysis and by incorporating a wide theoretical foundation, that lend perspectives to contrasting layers of DSB.

5. Overview of organizational structure theories

Organizational structure constitutes the core of how a company organizes and coordinates its activities. There are several theories of organizational structure that have shaped the discussion within management research.

The first management theory on record is the division of labour model by Adam Smith. This classical theory is still being used today, based on the notion that the theory was and still is focused on economic efficiency (Hatch, 2018). One mentionable example is the use of division of labour in car manufacturing, where workers are specialized in certain areas, with an emphasis on differentiation of work tasks.

To build upon the theory of division of labour, Émile Durkheim, a French sociologist, worked on theories emphasizing the need for a social structure. Instead of the division of labour being about efficiency, Durkheim sought to add the social element into organizations, which gradually fostered the development of organizational culture and the distinction between the economics and humanistic aspects of an organization (Hatch, 2018).

Max Weber's bureaucratic model, a cornerstone in classical organizational theory, presents a systematic and structured approach to working with and understanding organizational design. Emphasizing a hierarchical structure, Weber identified several key features that define the bureaucratic model, such as a clear chain of command, employment based on merit and a clear separation of personal and professional life. (Hatch, 2018). Weber believed that these key features offer efficiency in organizational operations. However, while the bureaucratic model provides stability and order, it may be criticized for being inflexible and less adaptive to change.

Building on these ideas, Henry Mintzberg challenged conventional perceptions of organizational structure in his book "Structure in Fives: Designing Effective Organizations." Mintzberg identifies five fundamental organizational types: the simple structure, machine bureaucracy, professional bureaucracy, the diversified organization, and adhocracy (Mintzberg, 1983). Each type reflects different ways in which organizations can be structured to achieve efficiency and fulfil their goals.

5.1. Mintzberg's theories

Here we will give an overview of what theories will be utilized in the analysis. These theories give us more of an insight into the organization's structure, than DSB's own fundamental organizational structure model.

5.1.1. Five basic parts of an organization

Mintzberg's five structural configurations theory suggests that organizations exhibit distinct structural forms, categorized into five overarching patterns. The fundamental five components of an organization are: operating core, strategic apex, middle line, technostructure, and support staff.
The operating core of an organization is the organization's overall operations. Here we find the workers that constitute the money-making aspects of an organization, e.g. the train operators of DSB. The strategic apex is the top-level management of an organization. Here we find the chief executive officer and the board of directors. The middle line of an organization is the middle-level management. Here we find workers that constitute the management of others. Such as an operations manager who manages the operating core. These three organizational parts fit together, where the strategic apex gives orders to the middle line, and then the middle line gives these orders to the operating core.
We then have two other parts of an organization: The technostructure and the support staff. These two's work does not directly affect the three other parts of the organization. The technostructure analyses the inner workings of the company and the support staff gives support, as the name states, outside of the operating flow. In the technostructure we find highly specialized IT personnel, who makes analysing tools and in the support staff we find departments such as a cafeteria or customer service.
Depending on the communication dynamics among these different parts of the organization, a completely different organizational structure is formed, each with distinct requirements for effective operation (Mintzberg, 1983).

5.1.2. Intercommunication

Mintzberg's theory on intercommunication is very useful for managing organizations. It is useful to look at what kind of organization you're working with based on the communication between the different basic parts of the organization. Here we are going to look at two different theories, each with five steps. We have the more general theory, which is based around communication with a small number of workers, and then the bigger theory, which is the flow of communication throughout the entire organization. The five steps based around a small number of workers is: Mutual adjustment, direct supervision, standardization of work processes, outputs and skills. The other five steps of communication steps are: The flow of formal authority, the flow of regulated authority, the flow of informal communication, the set of work constellations and the flow of an ad hoc decision process. (Mintzberg, 1983).

Mutual adjustment is based around informal communication, whereas as direct supervision is based around formal communication. The three sets of standardization are different from mutual adjustment and direct supervision, in the sense that mutual adjustment goes hand in hand with standardization. Direct supervision could also go hand in hand, but that depends on what kind of work they are doing.

The flow of formal authority is based around direct supervision. The flow goes form the top down to the bottom. The flow of regulated activity is a lot like the flow of formal authority, but there is a distinct difference. The organization that uses flow of regulated activity puts great emphasis on standardization. The neatness of formal authority and regulated activity disappears when working with the flow of informal communication. Here we have great emphasis on mutual adjustment, instead of standardization. The set of work constellations is a bit different than the others. Instead of focusing on either mutual adjustment or direct supervision, we here look at a mix of both. The work is layered in distinct groups in the organization. E.g. in a manufacturing company, a group could be focused fabrication, and another could be focused on assembly. And these two are two different work constellations, focused on their own work and coordination. The flow of ad hoc decision process is based around the communication needed to make a decision. The flow of communication can go through the entire organization before a decision is made. It can e.g. start in the operating core where a salesman meets with a costumer, who suggest a modification to a product. The suggestion then flows from the operating floor to the middle line, and then the technostructure, maybe also the support staff. It then gets to the strategic apex, where a decision is made. And then the flow goes from top to bottom again (Mintzberg, 1983).

These 2 theories can be mixed and matched, and normally these 2 theories would be mixed and matched according to an organization's wishes and goals (Mintzberg, 1983).

5.1.3. Five fundamental organization types

Henry Mintzberg theorized that there are 5 fundamental organization types, based on organizational structure and level of specialization. As mentioned in the overview, Mintzberg has built upon already existing theories, to make a general framework for these different organizational types. The simple structure is characterized by what it is not – elaborated (Mintzberg, 1983). It is as the name states: simple. There is no technostructure, no support staff and it is mostly coordinated through direct supervision by the strategic apex. Machine bureaucracy is characterized by routine. Most work in an organization with this model uses standardization of work processes. Division of labor is high in these organizations, and the structures are fine-tuned as integrated, regulated machines. In the professional bureaucracy we find highly trained specialists at the operating core. Instead of standardization of work processes, as in the machine bureaucracy, we see the use of standardization of skills. The divisionalized form is seen as an organization with many structures. Each division has its own structure, where they autonomously make decisions. The adhocracy is characterized by innovation and problem solving. To be a problem-solving organization, we cannot rely on standardization of any kind, considering innovation means to break away from established patterns. Therefore, the adhocracy tends to utilize mutual adjustment to coordinate its activities (Mintzberg, 1983).

5.2. Relevance to this problem

Mintzberg's theories can be applied to our problem, specifically within the IT department. By looking at how the department communicates and functions with the other departments of the organization, we can get a better insight on how DSB manages challenges related to technological advancement. And by mixing organizational structure with company culture, we can get an overview of how the organization's intercommunication and interdependency works. Overall, Mintzberg's theories and theories on company structure can play a crucial role in understanding and addressing technological challenges in DSB.

5.3. Strengths and limitations

5.3.1. Strengths

One of the core strengths of Mintzberg's theories on organizational structure is that the theories can give a broad and holistic view of an organization. And not just an organization, but also on the different departments within DSB, which is a good fit for our project, since we are focusing on the IT department. Not only do the theories and models give us small insight into the organization as a whole, but it also provides an overview of every small piece of the organization and provides several other models to understand each smaller part.

Mintzberg's organizational framework is versatile and applicable for a wide variety of organizations. The theories and models are not one-size-fits-all, but instead the theories provide flexibility and adaptability. Organizational managers and researchers can mix and match components, providing a nuanced and comprehensive analysis that accommodates the diverse structures and advocates the needs of different contexts.

5.3.2. Limitations

Mintzberg's framework may oversimplify the complexity of real-world organizations. It provides general categories, but organizations often exhibit diverse and nuanced structures that may not neatly fit into Mintzberg's predefined configurations.

Mintzberg's framework is primarily descriptive. There is not really a prescriptive guideline to follow, when wanting to research organizational structure. Mintzberg is very good at describing what exists at the moment or in the past but does not really offer any kind of creative guess as to what could be in the future.

Considering this project is about company culture, Mintzberg does not really talk about organizational culture, even though a big part of organizational dynamics is formed around culture in the company. Even though he has theories about intercommunication, this has nothing to do with organizational culture.

One major limitation of Mintzberg's theories is that they are data intensive. We need a lot of data and information about how DSB's organizational structure works, but that is easier said than done, considering DSB have not publicized their organizational structure, except for a fundamental model that does not offer any substantial insights.

6. Organizational culture theories

Organizational culture, as a concept observed and described by academics, emerged in the middle of the 20th century. Elliott Jacques was the first theorist to describe organizational culture, in his book The Changing Culture of a Factory in 1952. His reasoning behind the inclusion of organizational culture was that researchers of organizations, at the time, had ignored the human and emotional elements of life in an organization (Hatch, 1997). This early definition emphasized customs, traditions, and ways of thinking that were relevant for new members of a factory to be accepted in their place of work.

In the late 1970s and in the beginning of the 1980s, organizational culture entered the mainstream as several books on the subject were published. Some authors, such as Terrence Deal and Allan

Kennedy, authors of Corporate Cultures: The Rites and Rituals of Corporate Life, and Tom Peters and Robert Waterman, who wrote In Search of Excellence, were consultants, but several academics had begun formulating theories on the subject as well. These included Andrew Pettigrew, William Ouchi, Meryl Reis Louis, and Edgar Schein. New definitions of organizational culture emerged, identifying, describing, and defining it throughout the structures of, and within, all types of organizations (Hatch, 1997).

Of note is Geert Hofstede's theory of cultural dimensions, which was based on a long series of surveys from IBM in the 1960s and 1970s. His six dimensions of culture are power distance, uncertainty avoidance, individualism versus collectivism, masculinity versus femininity, long-term versus short-term orientation, and indulgence versus restraint. These dimensions of culture show significant differences between cultures on an international level and have had a lasting impact on international organizations (Hatch, 1997). Hofstede's theory is employed globally, to help organizations work across borders and continents, as it chiefly applies to cross-country culture. As such, it can only be applied to a certain extent by organizations that are operating and serving customers within one national demographic.

The influence of organizational culture theories is significant to this day, as it is almost a given that managing corporate culture correctly helps organizations to achieve their goals more efficiently. To this argument, James Heskett writes in his recent book, Win from Within: "The relative profitability of two organizations in the same business can be predicted with a high degree of accuracy utilizing only culture-related information." (Heskett, 2022). The culture information that Heskett refers to is related to the internal cultures within the company. Edgar Schein's theory and model apply directly to this territory as it allows identification of cultures and sub-cultures within organizations. His book, Organizational Culture and Leadership (first edition 1985, fifth edition from 2016), provides guidance on improving processes and structures, based on cultural capacities to encourage efficacy in an organization.

6.1. Schein's Theory of Organizational Culture and Leadership

Schein's theory of culture is situated at the organizational level. Culture, to Schein, differs between organizations and between departments within those organizations. Schein's model of culture has three layers, ordered in levels of perceived visibility.

The first layer is the artifacts layer, within which are visible organizational structures, processes, architecture, language, products, etc. The first layer is easy to identify, but hard to decipher – two similar artifacts may hold different meanings in different organizations (Schein, 2016).

The second layer is the espoused values layer. These are relatively easy to observe, as they often are written down or regularly repeated by workers and managers. One noteworthy characteristic of espoused values is that they are not necessarily correct, or true - not because managers are lying, but because these values are often aspirational. Some espoused values are expired, despite frequent repetition, as they were inherited from founders and previous members of the organization (Schein, 2016).

The third layer of organizational culture in Schein's model is the layer of basic underlying assumptions. This layer is characterized by being the hardest to identify, as members of the group in question have stopped questioning the correctness of this assumption and are applying it to their world almost without conscious thought. These assumptions often stem from previous experiences where a certain course of action, when repeated, has produced similar outcomes – desirable or otherwise. These outcomes reinforce a shared belief among members in the group that the course of action is non-negotiable and, when a negotiation process ceases to exist, the decision process falls into the background of the group's consciousness. Schein describes basic underlying assumptions in his definition from the first publication of Organizational Culture and Leadership from 1985:

> *"The pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to these problems."* (Schein. 1985)

That is to say, basic underlying assumptions have an influence on a group or organization's decision-making processes on a profound level. When faced with challenges, the members of the culture group will subconsciously draw on their shared, inherited, and learned experiences – which will reflect the quality of the solution (Schein, 2016).

Schein's model allows us to classify various observations into the three layers. After a classification, we can rationalize the following. Artifacts, while easy to find and observe, are hard to draw meaningful conclusions from. Espoused values are unreliable, as they may be aspirational or meaningless. Basic underlying assumptions, while not trivial to identify, have a sizeable impact on

decision-making within an organization, as they subconsciously inform members of a group how to think in the face of new challenges as well as routine tasks.

6.2. Strengths and limitations

One of Schein's model's key strengths lies in its layered approach, which provides a nuanced understanding of organizational culture, through a practical prism of artifacts, values, and underlying basic assumptions. When approaching a cultural analysis of a company from a research perspective, Schein's model helps by focusing the researcher on including all three layers of the model. Producing a cultural analysis based on the first and second layers of the model could be tempting to those interested in the company's performance, as it would generally be feasible to do from an outside position and could be made without any involvement from the organization's members. However, as described, the artifact layer is often indecipherable, and the espoused value layer can be contradictory to the underlying assumptions and beliefs. When exploring the third layer, we can potentially gain novel insight into the organization that was consciously unknown to the organization members, which can be actionable in formulating effective change goals for the organization.

Change goals based on underlying assumptions, created along with knowledge of the organization and its members in relation to artifacts and espoused values, are a pragmatic approach to improving an organization's productivity and efficacy. It is often the case, according to Schein, that relatively simple adjustments to artifacts, among which we can count the structure of the company, and an honest evaluation of espoused values can create the change needed in the company.

It is necessary to emphasize that a cultural analysis conducted with Schein's model, or any other model for that matter, only reflects the culture of the group members surveyed or questioned. There are several levels of culture which cannot be attributed to the organization and the shared experiences within the group. Examples of these are the national, ethnic, and language cultural aspects of group members, which Geert Hofstede addresses in his theory of cultural dimensions. Additionally, some professions exhibit cultural tendencies, inherited from their education and other members in their vocation. This observation is as obvious as it is relevant; it comes as no surprise that software engineers have a different approach to problems, based on their shared, comparable, previous experiences, as opposed to marketing specialists or those in customer service.

Other notable limitations of Schein's model are the risks of oversimplifying the complexity of an organization's culture, while at the same time adding complexity on an abstract level, making it challenging to apply practical changes to an organization in response to the perceived shortcomings

drawn from a culture analysis. To this end, it is prudent to emphasize that a balance between abstract notions of an organization's culture and observable, describable phenomena within the organization is needed, to use the model effectively. To produce results which have an appropriate level of complexity, researchers should include as many members as possible of the group to be analysed. This will give members an insight into the process of the analysis, which, hopefully, leads to a better understanding of, and recognition of potential findings.

Additionally, an overemphasis on culture can potentially misdirect the group in question as well as its individual members, into unproductive endeavours. While the methods described by Schein stress the importance of individual members in producing a cultural analysis, a cultural analysis in and of itself runs the risk of underemphasizing the individual agency of group members. A misunderstanding, or indeed an understanding, of the culture of a group could excuse members with a sense of cultural determinism to explain away deficiencies and problems in the group. Individual choices are still possible within a group, regardless of how embedded the underlying basic assumptions are, and personal responsibility and agency should not be discounted in this regard.

6.3. Relevance to this problem

As we have clarified in section 2.3 DSB is facing a substantial task of acquisition that spans across all departments, and involves all levels of the organization, as well as customers and stakeholders. In that light it is crucial to have a good understanding of the basic underlying assumptions within the organization, as this insight can help to anticipate most types of internal challenges, in projects of all sizes.

Cultural obstacles within groups can take different forms and are hard to shift or change. Basic underlying assumptions can have a high degree of inertia, and depending on several factors, such as the structure of the company and the willingness of management, culture change is not necessarily the correct approach. It is, however, relatively straightforward to work around or alongside cultural barriers once they have been identified.

All aspects of a company can have relevance when mapping its culture. DSB has a long history and has been restructured and reorganized several times, since its founding and in recent memory. DSB is a public service with a high customer throughput and large visibility in its domain of collective transportation. Additionally, rail transportation is a profoundly green and efficient mode of mass transportation (IEA, 2019). These aspects, among others, may have a large impact on the internal culture of DSB, which can only be discerned through an in-depth analysis of artifacts, espoused values, and especially the basic underlying assumptions.

An aspect of mega projects is that they invariably impact and occupy all levels and departments of an organization to some degree. In this light, a cultural assessment based on Schein's model of any department within DSB can be relevant to managers interested in meeting the goals of the project. An analysis of the entire organization may not necessarily be meaningful, as vocational sub-cultures and different national makeups of the departments would yield only broad generalizations, which could be nearly unactionable for management and group members.

7. The Iron Law of Megaprojects

Theories on structure and culture are fundamental to an organization's efficacy and efficiency throughout the organization. The vast scope of these two theoretical frameworks can aid in explaining any aspect of an organization's processes throughout the organization's lifecycle. However, they are too broad to be applied in general; it is unhelpful to simply advise a business to change their culture or their structure just because it could be better. To assist in this project, and to produce relevant advice for DSB, we can regard the advice gathered from the previous theories through the lens of the common problems associated with managing megaprojects. The procurement of the new fleet of 100 electric trains, as well as their implementation, in conjunction with the electrification of the rail network, is a megaproject in the fullest sense of the definition. Research on the topic of megaprojects has been underway for the last 20 to 30 years, most notably by Bent Flyvbjerg and his team at Oxford University. Consequently, the logic here is that applicable advice and experience from Flyvbjerg's findings, contrasted with the two aforementioned theories, can give us useful information and predictions about what is in store for DSB, and how to prepare for it, through a focus on culture and structure.

What Bent Flyvbjerg has termed "the iron law of megaprojects" will in this section be regarded and employed as a theory on predicting outcomes of large-scale projects. Bent Flyvbjerg has written the introduction to the book, "The Oxford Handbook of Megaproject Management" from 2017, in which megaprojects are defined, analysed, and discussed from a strong theoretical foundation by Flyvbjerg himself and several other researchers. Additionally, Flyvbjerg and Dan Gardner published the book, "How Big Things Get Done" in 2023, which summarizes and enhances accessibility to the public about the emerging field of megaproject management. These books are based on decades of research on megaproject management, Flyvbjerg and many collaborators have gathered empirical data on megaprojects to understand and explain a predictable pattern that stretches as far back as data allows us to examine. The pattern, or "Iron law of megaprojects," is that large projects invariably are "Over budget, over time, under benefits, over and over again" (Flyvbjerg, 2017). The

strength of this pattern is such that we believe it is possible to make fast and general, yet convincing and near-certain, predictions on the outcomes of all large-scale projects.

Megaprojects, as defined by Flyvbjerg, are large-scale, complex ventures that take many years to complete and are characterized by typically costing over a billion dollars and involving several stakeholders (2017). For the purposes of Flyvbjerg's definition, there are essentially only three parameters that a megaproject can fail or succeed on: budget, time, and utility. To be considered a complete success, any megaproject would have to succeed on all three of these parameters, while failing just one leaves the project in the adverse column.

> *"If, as the evidence indicates, approximately one out of ten megaprojects is on budget, one out of ten is on schedule, and one out of ten is on benefits, then approximately one in a thousand projects is a success, defined as on target for all three."* (Flyvbjerg, 2017, p. 11)

The above expression of the concept of success can be construed as too critical. Most people and managers come to expect some shortfalls in large projects, perhaps because they are so frequent, and can accept some degree of leeway in this regard. However, it is very common that the degree of failure is of an intolerable magnitude. Rail projects have an average cost overrun of 40 percent combined with an average demand shortfall of 34 percent (Flyvbjerg, 2017, p. 9). For the Eurotunnel between England and France, an allowance of 10 percent was negotiated with investors for unforeseen circumstances. The project was 80 percent over budget, in addition to financing costs which were 140 percent over budget. Benefits also came short as the project was only able to produce 50 percent of the expected revenue. The outcome of the project, for England, was a negative internal rate of return of 14.5 percent (Flyvbjerg, 2017, p. 9). To add to the point of how often big projects fail to meet the success criteria parameters, in Flyvbjerg and his associates' database of megaprojects, the team has been unable to draw statistically valid conclusions on successful projects, as the sample size is simply too small (Flyvbjerg, 2017, p. 11).

The causes of delays and budget overruns in megaprojects vary. There are essentially two phases of megaprojects, the planning phase, and the execution phase. Having a long and thorough planning phase, which is relatively cheap, can potentially reduce problems and shorten the execution phase, which is invariably expensive (Flyvbjerg & Gardner, 2023). Nevertheless, fiascos in megaprojects cannot simply be chalked up to a lack of planning; the quality of planning is also a factor, along with a plethora of other internal and external factors which are meaningful to identify before starting large projects (Flyvbjerg, 2017).

The following is a non-exhaustive set of overarching factors from Flyvbjerg's Iron law that are relevant for the purposes of analysing DSB's procurement of 100 electric trains. The chosen examples are long planning horizons, changing management, multiple stakeholders, non-standard solutions and technology, and unpredicted unforeseen events. These examples are not necessarily applicable explanations for shortcomings in all projects. They can, however, potentially serve as explanations for the shortcomings, as some of Flyvbjerg's examples are root causes of further examples.

Long planning horizons are a central feature of megaproject management and can amplify the magnitude of all other causes of unsuccessful ventures. As multiyear timelines are a defining feature of megaprojects, this factor cannot readily be forfeited, but development and construction processes should be held as short as possible to limit the window of time in which things can go wrong. Additionally, long timelines make planning difficult, as the picture of what to do and when becomes increasingly diffuse the farther away those plans are in time (Flyvbjerg & Gardner, 2023).

Because of the long timelines of megaprojects, there is a substantial risk that the group of managers within an organization that started the project is not the group that finishes it. In the literature on megaprojects, the causes of this turnover are numerous: retirement, poor retention, illness, death, firings, etc., are facts of life that become more realistic as the window of time increases. This can have terrible consequences for the projects, as managers with deep domain expertise and experience are one of the prerequisites for successful projects (Flyvbjerg & Gardner, 2023).

Another defining feature of megaprojects is the fact that they are rarely confined to a single organization; they almost always involve multiple stakeholders and engage numerous developers, across myriad disciplines, from outside organizations. Planning in such an environment becomes complex, approaching impossible as potential external factors increase (Flyvbjerg, 2017). This fact leads to the conclusion that any organization undergoing a megaproject is in a turbulent environment, which requires some degree of horizontal structure and an adaptive culture, to anticipate challenges (Daft, et al, 2020).

The technologies involved in megaprojects are often non-standard, which leads to "uniqueness bias" among managers and planners (Flyvbjerg, 2017). When managers believe that their project is completely new and innovative, they limit themselves from learning from past experiences. These experiences could come from within the organization, based on previous projects, as well as from outside – brought in either through thorough research or by experienced experts with deep domain knowledge. According to Flyvbjerg, the available experience is not utilized often enough because

managers often want to perceive their project as unique, to maximize ownership and prestige associated with the project (Flyvbjerg & Gardner, 2023).

As is becoming evident, time management through thorough planning, along with experienced managers in an adaptive culture, can mitigate the risks associated with large-scale projects. However, there are no guarantees of mitigation as catastrophic events, such as pandemics, economic downturns, and accidents can put any project at risk. The principal guarantee we can draw from Flyvbjerg and his team's research on megaprojects is that any megaproject, not properly planned, will be a fiasco (Flyvbjerg, 2017; Flyvbjerg & Gardner, 2023).

8. Analysis

The next step of the project is to apply theories, as well as other external findings, to get a holistic understanding of how DSB approaches the implementation of new core technologies. In particular, cultural and structural analyses explore this matter, supported by the most relevant extracts from the interviews.

8.1. Interview analysis

In this part of the analysis, we explore DSB's proactive approach to achieving CO2 neutrality by 2030, a goal that aligns with the Danish government's environmental objectives but is not directly mandated by them. We also examine the impact of external pressures on DSB's priorities, such as infrastructure upgrades and the integration of new trains. Insights from employee's 'S' and 'N' provide perspectives on project management challenges, workload management, and the strategic evolution of DSB's technostructure. These elements together highlight the interplay between organizational strategies, government influence, and the practical realities of executing large-scale projects.

8.1.1. DSB's CO2-Neutral Goal and Government Influence

> *"Vi har en ledelse der er ret proaktiv. Det vil sige at man i højere grad ser på hvad er det regeringen gerne vil lige nu. Og så går de op til regeringen og siger at det her er vores forslag til hvordan vi kan hjælpe jer med at opnå det I gerne vil. Så jeg tror egentlig at den her CO2-agenda egentlig er en vi selv har valgt, kan man sige" – S. ["We have a leadership that is quite proactive. This means that they more actively consider what the government wants right now. And then they go to the government and say that this is our proposal for how we can help you achieve what you want. So, I actually think that this CO2 agenda is one that we have chosen ourselves, you could say" – S.] (Translation by author).* (See appendix A, DSB Department leader)

DSB's ambition to achieve CO2 neutrality by 2030 reflects a proactive approach towards environmental sustainability. As S indicates, this goal is not a direct result of government enforcement but aligns with broader governmental aspirations. This proactive stance by DSB's leadership exemplifies a strategic alignment with current political priorities, especially in the context of environmental concerns. The decision to pursue CO2 neutrality, as per S's account, seems to be an independently set goal by DSB, which aligns with Danish government's environmental policies, rather than being a direct government mandate.

This approach by DSB mirrors Flyvbjerg's observations on the strategic alignment of mega projects with political and social objectives. As megaprojects often shape and are shaped by societal structures, DSB's initiative can be seen as a "privileged particle of the development process," influencing societal change towards greater environmental responsibility (Flyvbjerg, B p.7, line 263). The CO2 neutrality goal, while originating within DSB, resonates with broader societal and political values, showcasing a symbiotic relationship between corporate strategy and public policy.

8.1.2. External Pressures and Organizational Priorities

> *"Men du skal også have presset udefra for ellers er der jo i en organisation som DSB mange ting der er presserende. Vi er ved at købe nye tog. Vi står for at skinnerne skal renoveres de næste otte år som kommer til at give kæmpe udfordringer og forsinkelser. Så det er jo altid et spørgsmål om du ikke har tid til at gøre alt det du gerne vil. Så det er hele tiden hvad brænder mest." – S. ["But you also need pressure from the outside because otherwise, in an organization like DSB, there are many pressing things. We are about to buy new trains. We are facing the renovation of the tracks for the next eight years, which will pose huge challenges and delays. So it's always a question of not having time to do everything you want to do. So it's always about what's burning the most." – S.] (Translation by author).* (See appendix A, DSB Department leader)

The influence of external pressures on DSB is significant, as highlighted by S. The organization faces various pressing concerns, from the adaption of new trains to the future of railways. These priorities showcase the dynamic and sometimes reactive nature of organizational decision-making within large transportation entities. External pressures, such as infrastructure upgrades or electric advancements, demand substantial focus and resources, often shaping the organization's immediate priorities.

This scenario is reflective of Flyvbjerg's concept of megaproject management, where external factors and stakeholder interests significantly influence project decisions and priorities. The "fires" that DSB departments have to focus on, such as replacing diesel trains with electric ones, highlight the complexity and risk inherent in such large-scale, transformative projects. (Flyvbjerg, B, p.7, line 272).

8.1.3. N's Perspective on Project Estimates

"Nej Men det der med. Hvor man bare står og tænker. Vi har ikke en løsning på det her. Vi kan ikke komme videre." – N. ["No, but that thing where you just stand there thinking. We don't have a solution for this. We can't move forward." – N.] (Translation by author). (See appendix B, DSB worker)

"Øh. Det ved jeg. Ærligt. Ikke. Jeg tror faktisk. De stoler på lidt mere. Man regner med. Fordi. At. Det er sjældent. At når man står. I det. Og siger Der er 10 procent af tiden tilbage. Og vores projekt er 70 procent. Færdig. Og man står og kigger på det og tænker. Vi når ikke. At blive færdigt. Med de timer der er afsat" – N. ["Uh. I don't know. Honestly. I actually think. They trust a bit more. One assumes. Because. It's rare. That when you are in it. And say There's 10 percent of the time left. And our project is 70 percent. Done. And you stand there looking at it thinking. We won't. Be able to finish. With the hours allocated." – N.] (Translation by author). (See appendix B, DSB worker)

The perspective of individual workers at DSB on project estimates, particularly the realistic attainment of project goals within set timelines and budgets, reveals a ground-level view of megaproject challenges. As N notes, there is often scepticism and uncertainty among the workforce regarding the feasibility of project deadlines and budgets. This sentiment reflects a critical view of project management, where frontline workers may perceive a gap between management expectations and on-the-ground realities. This perspective is called optimism bias and strategic misrepresentation in megaprojects. Workers' scepticism can be seen as a pragmatic response to the inherent risks and uncertainties of large-scale projects, which often suffer from cost overruns and delays. Flyvbjerg argues that megaprojects are prone to overly optimistic forecasts and underestimation of risks, leading to a disparity between initial projections and actual outcomes (Flyvbjerg, B p.7, line 317). The views expressed by N resonate with this theory, suggesting that workers at DSB may be acutely aware of the potential for such discrepancies in their projects.

8.1.4. Workload Management

"Jeg som leder er den eneste i vores afdeling der ikke faktisk registrerer tid. Så alle de medarbejdere skal egentlig registrere tid på et projekt. Men det vil sige at indtil der er et projekt der har et budget så må de egentlig ikke arbejde på det." – S. ["As a leader, I am the only one in our department who does not actually record time. So, all the employees are actually supposed to record time on a project. But that means that until there is a project that has a budget, they really should not be working on it." – S.] (Translation by author). (See appendix A, DSB Department leader)

At DSB, workload management within departments, as described by S, revolves around project registration and allocation based on budgetary considerations. This approach indicates a structured process where projects are prioritized, and resources are allocated based on strategic decisions from upper management. The necessity for projects to have a budget before work commences underscores a disciplined approach to resource allocation and project prioritization. This method of workload management can be looked upon as megaproject governance. The distribution of budgets and resources in line with strategic objectives reflects a process of careful planning and control, this is crucial in managing the complexities and risks of large-scale projects. The need for meticulous planning and budget allocation resonates with Flyvbjerg's emphasis on the importance of upfront planning and rigorous management in ensuring the success of megaprojects (Flyvbjerg, B p.7, line 309). In DSB's case, this structured approach to workload management reflects an attempt to navigate the inherent complexities and resource demands typical of large-scale transport projects.

8.1.5. AI and Machine Learning Department's Evolution

> *"for tre år siden der valgte man så for DSB's centralhold at sige nu det her AI og machine learning det regner man med bliver strategisk vigtigt for organisationen så derfor tager vi det nu ud af den her innovations-inkubator og gør det til en afdeling." – S. ["Three years ago, the central team at DSB decided that AI and machine learning are expected to become strategically important for the organization, so they took it out of this innovation incubator and made it into a department." – S.] (Translation by author).* (See appendix A, DSB Department leader)

The evolution of DSB's AI and Machine Learning department reflects a strategic response to emerging technological trends and organizational needs. As highlighted, this department, initially part of an innovation incubator, was recognized for its strategic importance and subsequently established as a standalone department. This transition from a peripheral innovative unit to a core department within DSB signifies the organization's recognition of the growing relevance of AI and machine learning in enhancing operational efficiency and decision-making processes. This evolution mirrors the dynamics of megaproject environments, where adaptation and responsiveness to new technologies and methodologies are critical. The shift in DSB's structure to incorporate an AI and Machine Learning department illustrates the organization's strategic adaptation to the technological sublime – one of Flyvbjerg's "four sublimes" driving megaproject development. This sublime highlights the excitement and potential benefits derived from integrating cutting-edge technology into core operations (Flyvbjerg, B p.7, line 244). DSB's initiative to mainstream AI and machine learning into their organizational framework exemplifies a proactive approach to harnessing

technological advancements, aligning with Flyvbjerg's insights on innovation in megaproject management.

8.1.6. Balancing Project Registration and Execution: Perspectives from S and N

> *"Vi er begyndt at prøve at køre 14 Sprint som bruger 14 dage hvor vi fokuserer på et system." – N. ["We have started to try running a 14 sprint which uses 14 days where we focus on a system." – N.] (Translation by author).* (See appendix B, DSB worker)
>
> *"vi har sådan en funding-model. Altså måden du får midler på kan man sige til dine projekter i DSB det gør du egentlig... Altså vi har en budgetproces som for 2024 da den startede den i... Hvad var det? Maj?" – S. ["we have such a funding model. That is, the way you get resources for your projects at DSB, you actually do it... That is, we have a budget process for 2024, it started in... What was it? May?"- S.] (Translation by author).* (See appendix A, DSB Department leader)

The balance between project registration and execution at DSB, as articulated by S and N, involves a meticulous process where projects are evaluated and registered based on their alignment with strategic priorities and budgetary constraints. This approach suggests a structured and hierarchical decision-making process, where project initiation is contingent on formal approval and resource allocation by upper management. The insights from S and N indicate a system where departmental efforts are closely aligned with organizational priorities and budgetary considerations. megaproject management underscores the importance of such structured decision-making processes in managing complex and large-scale projects. The registration and execution balance at DSB can be seen as an example of Flyvbjerg's emphasis on rigorous upfront planning and control mechanisms. These are essential for mitigating risks associated with cost overruns, delays, and benefit shortfalls, which are common in megaprojects (Flyvbjerg, B p.7, line 309). DSB's approach, as described by S and N, reflects an attempt to navigate these challenges through a disciplined and strategic allocation of resources and prioritization of projects, resonating with Flyvbjerg's principles of effective megaproject management.

8.2. Cultural analysis of DSB's IT department.

Through our observations and interviews with DSB staff we perceive that the IT departments within DSB are somewhat isolated from the rest of the organization. To follow Schein's model, it is logical to start at the artifact level of the cultural analysis. When questioned, one worker emphasized the open office plan in his department. In the respective departments of the software side of organizations, open offices are incredibly common, because they are theoretically conducive to teamwork and a dynamic workplace environment. This office setup is presumably intended to make communication

with and within the department easier by reducing friction, but no conclusions can be drawn at this level of analysis. Studies on the effect on both workers and their output, in open offices, even conclude that open office plans are detrimental to the virtues that they supposedly enhance i.e. Information sharing and job satisfaction, when compared to more cellular office plans (Groeniger & Burdorf, 2020). To conclude anything concrete about culture in DSB's IT departments by the observations on the artifact level is folly. Further analysis in the subsequent culture levels is required, but we can draw the careful estimation, that the management of DSB's IT department would *like* their department to be a dynamic workplace.

Espoused values are easy to find, and easy to identify. They are, however, not necessarily a reflection of reality, but can often be seen as a set of aspirations. In DSB's strategy, "Markedsorienteret DSB" (Market oriented DSB), the company writes: "We develop the workers and the culture" (*Vores Formål*, n.d.). The strategy section goes on to include meaningful work, inspiring leaders, and inclusive values and goals. The department head we interviewed expressed a positive view of his immediate leaders as well as the top management team and he emphasizes their high level of domain knowledge within their respective fields. This squares well with the notion of inspiring leaders and lends credence to DSB's mission of developing workers and their culture, as good leadership is the starting point for such endeavours, according to Schein.

Positive social dynamics and integrated work environments are considerable strengths for teams and organizations, regardless of the process and workflow type in the given situation. We questioned our interviewees on the social side of DSB and they both mentioned elements that one would expect from typical Danish workplaces, a Christmas party, training seminars, and Friday bars. The Friday bar was an experiment that took place in the first two quarters of 2023 after which they ended without a definitive explanation to our interviewees. The second interviewee identified the Friday bar as "Kind of lackluster" ("lidt tamt"), partly because the participants had self-sorted into their respective departments and because a significant number of coworkers, worked from home on Fridays and were not able to participate. Forcing or nudging social interaction across departments would presumably be a way to strengthen the overall culture of DSB, but Schein's theories on subcultures, departmental and vocational, help to explain why that is not a successful approach. Talking to and socializing with members outside of one's own area of expertise does not come natural to most people with the Danish background (van Bakel & Vance, 2023).

A Friday bar concept, when seen as an artifact of culture demonstrates to us that DSB's management is actively working with culture and teambuilding in some capacity. Compared with the espoused values in their strategy these steps make sense. The lacklustre performance and subsequent

cancelation go to show that culture change takes effort on the side of management, to create suitable environments for positive change to take place. From this experiment on DSB's side we can argue that gaps between departments can hardly be filled with monthly beer and cocktails, conceivably explained by the fact that the strength of sub-cultures in the different departments is profound and have taken many years to develop, inside and outside of DSB.

The second interviewee who works in one of the IT departments presented some discernible evidence of a gap between his department and the rest of the organization. In explaining his workflows and projects he consistently referred to the department's "customers" even though his department exclusively works with departments and managers within DSB. We are not arguing that his perspective is wrong, the word customer is not wrong to use in any literal sense in this context, but had he used phrases like coworker or colleague he would not have been wrong either. Using the word customer creates a professional and sterile distance between his department and others, that hardly reflects a workplace with shared goals, values, and culture, as is stated in DSB's shared objective "We must create a common culture and direction through purpose-driven work with inclusive values and objectives." (Danske Statsbaner, n.d.-d).

It is not possible to pinpoint where this customer/colleague gap between the IT side and the rest of DSB originates. The explanation is likely multifaceted and stretches back before the working memories of group members on both sides, as it takes the form of a basic underlying assumption, which are characterized by their intangible origins and subconscious applications. Part of a mundane explanation is that the word customer is commonplace in the IT-sector and can be characterized as jargon when uttered by software developers, adhering to jargon is natural in vocational sub-cultures, but can be misconstrued in other settings.

Changing the workforce vocabulary has been done in other business and sectors to reshape perspective. Disney uses the term "cast members" for all employees in their parks to ensure that all employees, regardless of their role, view themselves as part of the show (Da Silva et al., 2023), and the Ritz-Carlton Hotel uses the phrase "We are ladies and gentlemen serving ladies and gentlemen", to instill a sense of dignity and respect in employees, elevating the nature of their work and encouraging them to offer a high level of service to guests (Wan, 2015). Such change initiatives must come from the leaders and managers of an organization and can be enforced until they potentially become natural and self-enforcing within the group or culture in question, at which point they become very powerful.

Drawing from the interviews with DSB staff and applying Edgar H. Schein's cultural analysis framework, we discern notable cultural gaps between the IT departments within DSB, particularly in

relation to the merger of distinct software divisions. At the artifact level, one DSB employee's account of the recent integration of the customer centre's IT team into the Dynamics 365 team illuminates the initial surface-level cultural clash. This merger brought together two departments with their own software systems, creating a scenario where employees suddenly faced unfamiliar technologies and processes. The employee’s expression of not feeling ownership over the newly integrated system is a significant artifact, hinting at underlying cultural disparities. Such feelings can stem from a misalignment of work practices and cultural norms previously established within each separate department.

Progressing to the espoused values, the challenges become more evident. DSB's overarching strategy, emphasizing market orientation and development of workers and culture, seemingly contrasts with the experiences of the IT staff post-merger. While the organization espouses values of unity and collaboration, the practical integration of these two IT departments reveals a gap between these ideals and the on-ground reality. The lack of a sense of ownership over the new department's software, as shared by the employee, suggests a misalignment between DSB's aspirational values and the actual experiences of its staff. This disparity could be indicative of insufficient measures in harmonizing the distinct cultures and practices of the merged departments, a crucial step in realizing the espoused values of an inclusive and united workforce.

To thoroughly understand the cultural dynamics at play, it is necessary to delve deeper into the underlying assumptions that drive these espoused values and surface-level artifacts. Schein posits that the core of an organization's culture lies in these often unspoken and unconscious beliefs and values. The discomfort and detachment expressed by the employee regarding the new software system suggests that deeper, fundamental beliefs about work, collaboration, and ownership might differ significantly between the merged departments. These underlying assumptions are critical in shaping how employees perceive their roles and responsibilities, especially in the context of a merger where reconciling different cultural backgrounds is key to creating a productive environment.

In the DSB interview, a case unfolds where a “customer”, who has a significant budget, sought the development from multiple departments for product development, only to face a draining of resources without any tangible outcomes. This incident shows intricate cultural dynamics within DSB's IT department.

This situation explains the mismatch in expectations on delivery. The departments, each entrenched in their own subcultures and operational norms, failed to align their output with the customer's expectations. This misalignment is not only a procedural lapse but speaks volumes about the cultural

underpinnings influencing project management. Schein's model prompts us to consider the deeper layers at play. The espoused values and underlying assumptions that shape departmental approaches and priorities.

The incident also casts light on the cultural demand behind the structure of software in DSB. The way software is structured and developed reflects more than just technical choices, it embodies the cultural character of the department. The incident exposes maybe different views on priorities within the software across different departments. Schein would identify this as a manifestation of diverse subcultures within the organization, each with its distinct set of beliefs and practices. These varying subcultures, if not harmonized, can lead to conflicts and inefficiencies, as was evident in the inability to deliver on the customer's project.

8.3. Structural analysis

8.3.1. DSB's organizational structure

In order to get a holistic understanding of DSB's organizational structure, we hereby present a detailed model, based on Henry Mintzberg theories, outlining the placement of various departments within distinct elements of the organization. The following model has been produced by us, as a visual guide to the understanding of the organizational framework in DSB.

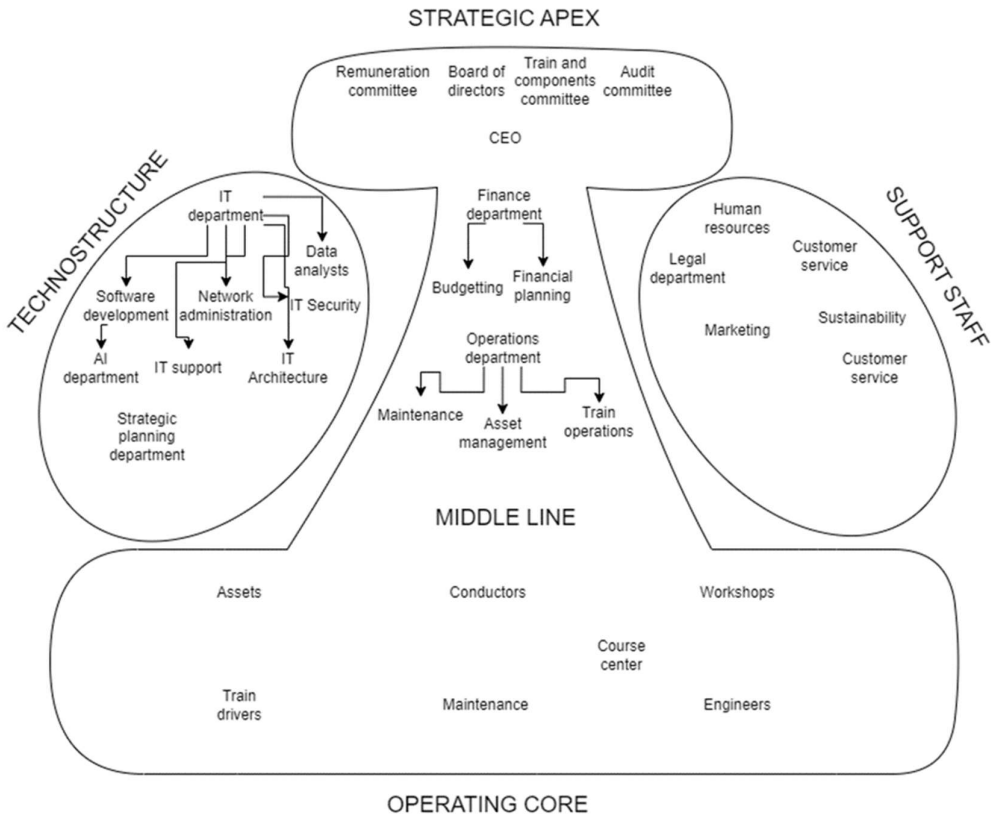

Figure 2: DSB's organizational structure

8.3.2. Introduction

An introduction of the model will be presented here. Each element of the organization will be displayed, introduced, and analysed, based on various theories explained by Henry Mintzberg. The model was created based on inputs from interviews, figure 1 and a deep dive into LinkedIn.

8.3.3. Strategic apex

"*The strategic apex is charged with ensuring that the organization serves its mission in an effective way, and also that it serve the needs of those who control or otherwise have power over the organization.*" (Mintzberg, 1983). The strategic apex is at the top of the organization. Here we find the chief executive officer (CEO), the board of directors, the audit committee, the train and components committee and the remuneration committee. These elements of the organization have control of the organization as a whole. Other than this duty, Mintzberg proposed another three sets of duties that the strategic apex is responsible for; Direct supervision, make relations with the environment (etc., the ministry of transport and investors) and organizational strategy.

Direct supervision is one of the five coordinating mechanisms introduced by Henry Mintzberg, and it entails the responsibility of others in the organization. The CEO has direct supervision of the managers in the middle line. They respond to any strategy the CEO has made. We can also make the argument that the strategic apex in DSB is working with the standardization of work skills, considering two days for a CEO are rarely the same. They have not standardized their work outputs, because that is practically impossible for a CEO, considering their wide variety of tasks in an organization. And because of that, the strategic apex can standardize their work skills and achieve the goals they set. We can also argue that the CEO cannot utilize standardization of outputs, considering the CEO itself does not create outputs like the operating core does, so therefore, the CEO is, in theory, only able to utilize standardization of work skills.

With the CEO holding the ultimate decision-making authority, an example of the strategic apex's inner workings could be a strategy conceived by the CEO. As gleaned from the interview, the production of any output at DSB hinges on the preliminary task of securing the requisite budget. Thus, a critical step in this process involves collaborative discussions between the CEO and the finance department, where their plan is meticulously deliberated and refined.

8.3.4. Middle line

"*The strategic apex is joined to the operating core by the chain of middle-line managers with formal authority.*" (Mintzberg, 1983). This chain runs from the strategic apex to the first line managers. These first liners are the operations department in DSB. This departments have formal authority over the operating core, which will be analysed later. The coordination goes from the strategic apex, such as a new order from the CEO. This order goes to the operations department, where they

discuss their course of action. This should be done through mutual adjustment and standardization, considering mutual adjustment ties together with standardization. Whether this standardization is work skills, outputs or work process is hard to tell, without knowing the inner workings of every department in DSB, but it is tied together well with standardization, nonetheless. If a worker knows what kind of job they are doing, and they have the necessary skills for every endeavour made by the strategic apex, their work is standardized in some sort of way. After the discussion and the operations department have come to an agreement, this order goes to the operating core, where the order is executed.

An example of the inner workings of the middle line, could be when DSB wants to make a new promotional campaign. In order to do this, the financial department needs to facilitate meetings with the marketing department and the operating core, in order to align their promotional campaigns with the operation schedules. This necessitates effective communication and strategic alignment to ensure that marketing initiatives are synchronized with the operational capabilities of the organization. And therefore, the middle line acts as a vital communication mechanism for cross functional cooperation between different departments in different parts of the organization.

8.3.5. Technostructure

"*In the technostructure we find the analysts (and their supporting clerical staff) who serve the organization by affecting the work of others.*" (Mintzberg, 1983). The technostructure is, in this project, the most important aspect of the organizational structure of DSB. All the work done in the technostructure can be defined as affecting others work, outside of the operating workflow. They make tools and analysing programs to check the progress of the entire company. These tools can be at any level of the organizational hierarchy. It could be a course centre for the operating crew. In DSB, they make use of virtual reality to teach their operating staff how to operate their trains. It could also be at the top level, with a tool checking the entire company's performance, so that the strategic apex is able to make efforts toward efficiency, by checking possible inefficiencies in the company.

Most of the coordinating in the technostructure is done through mutual adjustment. It could also be argued that the coordinating is made by the standardization of worker skills, but since mutual adjustment and standardization of worker skills go hand in hand, most of the coordinating is made based on informal communication/Mutual adjustment.

The employees working in the technostructure are called "control analysts", because they control the work of others, as stated earlier with the quote from Henry Mintzberg (Mintzberg, 1983). But in

order to get a good insight into this, Mintzberg accumulated 3 types of analysts in an organization: Work-study analysts, planning and control analysts and personnel analysts (Mintzberg 1983).

Later in this analysis, we will get into what kind of departments there are in the technostructure, and what kind of coordination mechanisms they use, based on Mintzberg theories.

8.3.6. Support staff

"*A glance at the chart of almost any large contemporary organization reveals a great number of units, all specialized, that exist to provide support to the organization outside its operating work flow.*" (Mintzberg, 1983). Each department of the support staff exists to support the organization outside of its operating workflow. Just like the technostructure, the support staff do not have a direct impact on what goes on with the operating workflow from the strategic apex to the middle line and in the end down to the operating core of DSB. As seen in figure 1, we can see different departments in the support staff bobble, such as human resources and customer service. Even though this bobble may be similar to the technostructure, there is one distinct difference: Standardization. The technostructure is mostly based on standardization, considering most if not all workers in the technostructure are highly trained specialists. Of course, the support staff also have some highly trained specialists, such as the legal department. But there are also departments such as the cafeteria (This is not on the model, however that is because the different cafeterias are not owned by DSB).

Similar to the technostructure, the support staff can work on all levels of the hierarchy. The cafeteria provides food for all levels, although it is most likely that the operating core mostly utilize this. On the other side of this spectrum, we have the legal department. The legal department mostly works with the strategic apex in legal disputes.

8.3.7. Operating core

"*The operating core of the organization encompasses those members - the operator - who perform the basic work related directly to the production of products and services."* (Mintzberg, 1983). In the organization's operating core, the business's revenue is made here. People pay to get transported from a to b, and in order to make that a possibility, DSB hires train conductors and operators to oversee the trains and transport people to their destination. Engineers and workshops are also in the operating core, considering they are making sure that their revenue machines (trains) are functional and able to take people from a to b in an acceptable amount of time.

The operating core is the most basic part of an organization, yet it is the most standardized. Train operators, as told in the chapter about the technostructure, are trained within the company using virtual reality. This happens even before they set foot in a real train. So even before starting their

work, the workers in the operating core go through training in standardization. They learn what they need to learn, and from there, they know what to do in most situations. But as mentioned before, standardization and mutual adjustment go hand in hand. So even though their work is repetitive and standardized, they coordinate and communicate with others in an informal way. This mutual adjustment is mostly between workers in the operating core.

There is also direct supervision between the operating core and the middle line. The operation department coordinates and communicates with train conductors and operators in a formal way because something out of the ordinary may have happened, and they therefore need to determine their next step, with the help of formalization. And because something out of the ordinary can happen, they cannot always rely on standardization.

8.3.8. DSB's organizational type

In order to get a clear understanding of what type of organizational structure DSB operates as, we need to look at the characteristics of each organizational type. DSB does not utilize the simple structure. The simple structure is mostly used by small and new organizations, where there lack a clear set of rules and regulations (Mintzberg, 1983). We can assume, from the interview with the employee of the AI-department that in order for projects to be realised, they need to allocate a budget for it beforehand. In the simple structure, the decision-making process is very centralized at the top, therefore a middle line in the simple structure is not realistic to have. It is also evident that DSB make use of all coordination mechanisms. Mutual adjustment can be assumed to be used in the operating core, where they are directly supervised by the middle line. And in each of the departments, we find all three types of standardization.

It could be argued that DSB's organizational type is the machine bureaucracy, considering the vertical structure of hierarchy. The decision making in DSB is centralized to the strategic apex and the middle line, which could fit well with the machine bureaucracy, but since the machine bureaucracy focuses mainly on standardization of work processes (Mintzberg, 1983), We can infer that DSB may not align with the characteristics of a machine bureaucracy.

An example of the professional bureaucracy could be a university, where professors are highly specialized in their fields, with a lot of training and background knowledge. But since the operating core of DSB is not highly trained professionals like a professor, we can already conclude that DSB may not align with the professional bureaucracy's characteristics. It is also evident that DSB does not align with the professional bureaucracy based on the notion that one characteristic of this type, is the use of decentralized decisions-making with professionals with significant autonomy (Mintzberg, 1983).

You can argue that DSB fits well with the divisionalized form, based solely on figure 1. Each layer of the model could be seen as divisionalized. Each division with its own purpose and processes (Mintzberg, 1983). As stated in the interview, the IT department was responsible for making a new enrolment system. But as the interviewee states, the architecture did not consider that there were multiple departments making use of this. Therefore, we can see that other departments use other processes to accomplish their goals. As stated earlier, the decision-making is centralized to the strategic apex and the middle line. But since it is split between these, it could be argued that the decision making is decentralized. It could also be argued that the decision making is split not only between the strategic apex and the middle line, but also the technostructure and the support staff, with its own managers being responsible for their own departments.

The last organizational type is the adhocracy. With an emphasis on flexibility, decentralized decision making and a fluid and dynamic structure, we can conclude that DSB, like the simple structure, does not fit into this organizational type. In order for DSB's departments to start a new project, they first need to allocate the required budget. This can be argued as being inflexible, considering the time needed to allocate funds.

To conclude, DSB does have the characteristics of some of the organizational types, most notably the machine bureaucracy and the divisionalized form. It makes sense that a company, which is both state-owned and private, assumes the position of being a bureaucratic company. But perhaps the most interesting is that DSB assumes the characteristics of the divisionalized form more than the other organizational type. Each department is its own division in DSB, with its own processes and hierarchy. But that is not to say that the strategic apex is not the head of the company. The decision making is mostly in the hands of the CEO and board of directors, when making a decision for the entire organization. Therefore, the decision-making utilizes a centralized decision-making process.

8.3.9. IT department's organizational structure

As stated earlier, this report aims to look at DSB's IT department. In this chapter, we are going to analyse DSB's IT department, with an emphasis on structure and interdepartmental communication, based on Henry Mintzberg organizational coordination theory.

One aspect of an organizational structure analysis is how well the organization's departments communicate and coordinate with each other. In the first chapter of this analysis, we looked at the coordination mechanisms, such as mutual adjustment, direct supervision, and standardization. These will be used to analyse the IT departments communication, both the IT departments inner coordination mechanisms, and the IT departments coordination mechanisms with other departments in the organization.

8.3.10. Interdepartmental communication

To analyse the coordinating mechanisms within the IT department, we must address a fundamental question: How does the IT department at DSB influence the overall organizational performance?

One notable aspect of the IT department involves its comprehensive approach to standardizing skills and work processes. Upon receiving an order, they allocate funds and subsequently employ their established processes and skills to accomplish their objectives. During the interview, emphasis was placed on the use of "sprints" to complete projects. These sprints constitute a fundamental component of their workflow, characterized by the application of their specialized skills. The team comprises highly trained specialists with substantial experience in their field, enabling them to successfully attain diverse goals presented to them.

As previously discussed, the interplay between standardization and mutual adjustment is evident, suggesting that the completion of projects within the IT department involves the use of informal communication. Nevertheless, direct supervision serves as another crucial communication mechanism, given that each project is led by a designated project leader who establishes deadlines and issues directives to the team.

By examining these points, it appears that the internal processes of the IT department function effectively. However, as mentioned earlier, the necessity to allocate funds to each project endeavour poses a potential obstacle to future initiatives. Consequently, it can be asserted that this coordination structure may lack the desired flexibility and productivity for optimal project outcomes.

In the context of the interviewed department, a concrete example illustrating the coordination mechanisms relates to communication practices. The interviewee highlighted the concept of a "Single point of contact" within the department. This entails the understanding that communication flows through a designated supervisor, specifically the department manager. In this structure, the interviewee interacts with the manager, who, in turn, disseminates the discussions to every employee under their supervision. This communication model reflects a form of direct supervision characterized by a formal communication hierarchy, from manager to employees. The department manager serves as a central conduit, ensuring that information and directives are efficiently transmitted to the entire team. This specific example provides insight into the structured communication processes within the department, emphasizing a clear chain of command for effective coordination.

Examining the IT department's coordination with other departments, a noteworthy example emerges from the interview, specifically in the context of implementing a new enrolment system. This system, designed by the IT department, is intended for use by various other departments within

the organization. However, a challenge arose as different departments had distinct processes, and the system's architecture needed to accommodate these processes. To elaborate on this, the other departments in the organization anticipated that the new system would resemble the older one, but this was not the case, and therefore the other departments needed to relearn the system. This situation suggests a potential coordination mishap, emphasizing the importance of effective communication and alignment of expectations during projects overlapping with other departments.

The collaboration between the Human Resources (HR) and IT departments provides another compelling example of interdepartmental coordination. Specifically, when HR requires an analytical tool for analysing work mishaps, they turn to the IT department, which operates within the technostructure. The IT department, functioning as part of the technostructure, employs standardization of skills to create these analytical tools, treating other departments as their "clients."

In this scenario, the IT department's technostructural approach involves creating sophisticated tools that require a level of specialization and expertise. On the other hand, HR, acting as a client of the IT department, employs different coordinating mechanisms, such as mutual adjustment and standardization of work processes. Unlike the intensive training needed by the IT department to create these tools, HR focuses on ease of use and quick adoption, relying on muscle memory for efficient utilization.

Based on the interview, it appears that there is a limited awareness within the IT department regarding the work processes of other departments. The interviewee explicitly mentioned not having in-depth knowledge about the operations of other departments, except for very minimal knowledge, citing an example related to the HR system.

In summary, the IT departments inner communication mechanisms can be assumed to be satisfactory. However, between the IT department and other department, there might lack some clear communication. The lack of communication can inevitably lead to hindering projects, especially if these projects are supposed to be done with multiple departments in mind. The budgeting structure might also be a hindering function in the overall efficacy of DSB, considering every project might be hindered by a slow response to acquire the budget.

8.3.11. Evaluation of DSB’s structure

To conclude this chapter on organizational structure, we reintroduce organizational structure patterns in DSB. DSB is a vertical hierarchy organization, however, the decision-making seems to be decentralized, considering the organization resembles a more divisionalized form of organization, with decisions being made in corresponding departments of DSB To elaborate on this, the decision-

making is also decentralized when it relates to the budget structure. The department can make the decisions they want; however, they are highly restricted by the budget structure. Still, you could argue that the decision making is centralized in the strategic apex and middle line, but we feel it makes more sense to call it decentralized, or maybe centralized in each part of the organization, such as the technostructure and support staff.

The IT department of DSB seems to work effectively. With managers and project leaders overseeing the functionality of the department. A single point of contact structure makes sense, in the sense of giving the manager the responsibility to discuss the course of action and rely this information on everyone. However, the budget structure seems to play a big role in diminishing the flexibility and effectiveness of the IT department. Allocation of funds can hinder future projects because it takes a while for these projects to launch.

Another diminishing factor of DSB's structure, could be the lack of communication between departments. This could hinder projects, especially if these projects are interdepartmental, with multiple departments overseeing and working on a project.

Overall, the structure of DSB, as it is now, lacks a few structural configurations. If DSB were to readjust their approach with the divisionalized form and make it so each department could easily communicate with other departments, this could really improve the company's overall efficacy. Instead of having divisions, such as the technostructure and the support staff being separate, they could make divisions inside of divisions, with a clear and easy communication path from and to each department.

9. Discussion

In this report we have argued that large projects, like the IC5 acquisition, are complex affairs, and that DSB would in all likelihood face complications. This claim was substantiated in the end of November 2023 when DSB announced a 2-year delay in the delivery and implementation of the new trains (Danske Statsbaner, 2023, November 30). In this announcement, Jürgen Müller, the director of Strategy and rolling stock in DSB, stated the following: "It's a big and complex task to get all the details in place, so that the final design of the train sets meets all the specific conditions that apply in each country." The director of Alstom Denmark, Jörg Nikutta adds that assembling trains is a complex task with a myriad of moving parts, but that the final train design has been agreed upon by DSB and Alstom and is ready for production. The substantial schedule delay should raise concern, as it further opens the window of time in which further problems can occur.

Based on Flyvbjerg's Iron Law of megaprojects, predicting a delay in delivery was trivial, as it presents as a statistical certainty. What caused this specific delay is the opposite of trivial, presumably no-one in DSB or Alstom intended for the project to be delayed, if there were easy ways to safeguard against unwanted events they would have been implemented. Another indicator that the project would face difficulty is the fact that the reference case that DSB uses to gauge outcomes was also delayed, although these delays occurred later in the process. The reference case is the procurement of seventy-nine electric trains in the Netherlands, which was finalized by Alstom this year, a year behind schedule because the welding work on the trains were of a substandard quality (Hildebrand & treinreiziger.nl, 2022). Additionally, the performance of the Dutch program in fact points to possible further delays, as it shows difficulty with the production phase at Alstom, a process that DSB has diminished control of.

DSB's current structure, particularly its technostructure, seems to be ill-equipped for the efficient procurement of trains. This inability could stem from various factors such as bureaucratic hurdles, limited specialization in procurement processes, and perhaps an outdated approach to acquisition. Analysing the structure using Mintzberg's organization theories, it becomes evident that the technostructure's role in planning and controlling technical aspects is not fully optimized for large-scale procurements like train acquisitions. To address this, DSB could benefit from a strategic overhaul of its technostructure, and perhaps other departments, possibly integrating more agile methods and specialized teams to streamline the process.

The delays in information flow across DSB's fragmented IT departments highlight a significant challenge. This fragmentation likely causes inefficiencies and delays in decision-making and operational responsiveness. Given the organizational structure outlined in the analysis, it appears that the IT department, despite being part of the technostructure, operates in isolated silos, or divisions. These silos impede the swift and effective distribution of information. A more integrated approach, perhaps through centralized information systems or enhanced inter-departmental communication protocols, could mitigate these delays.

To provide a practical perspective on the efficiency of DSB's IT operations, our research includes an anecdotal account from a conversation with a DSB supplier in October of this year. The supplier, who has been collaborating with DSB for several years, described the experience of working with DSB on software and hardware projects as 'slow and cumbersome,' noting that communications could take several weeks—a stark contrast to similar companies, where similar processes reportedly conclude within days. This critique reflects a longstanding issue, as the supplier observed no significant improvements or changes over the past decade.

It is important to recognize that this account represents the subjective view of a single individual and is not necessarily indicative of broader systemic issues within DSB. While this perspective is critical of DSB's operations, it should be considered among other viewpoints, such as those interviewed for this project. Notably, our research did not uncover evidence that directly contradicts this narrative, but the lack of such evidence does not unequivocally validate the supplier's claims. This anecdote chiefly serves to highlight areas that could benefit from investigation and to strengthen the relevant points of our analysis, which we have already identified in our research.

The delays in delivering software to relevant internal and external partners of DSB is a critical issue. This delay could be attributed to the segmented nature of DSB's IT departments, as well as a possible lack of unified project management practices. The organizational structure analysis suggests that these departments might be operating with differing priorities and methodologies, leading to inefficiencies. Adopting a more unified approach to software development and project management, possibly through agile methods, could improve delivery.

In conclusion, while DSB's organizational structure has served its purpose to an extent, the changing dynamics of the railway industry and technological advancements necessitate a more agile and integrated approach, especially in its technostructure and IT departments. Adopting more modern methods and restructuring for better communication and efficiency could significantly enhance DSB's operational effectiveness and responsiveness to technological advancements.

A strong and positive organizational culture is very important in guiding the everyday actions and decisions within an organization. It forms the underpinning for how employees interact, resolve problems, and manage their workflows. For DSB, an organization faced with the implementation of large-scale transportation projects and the pursuit of environmental sustainability goals, the importance of a well-aligned and constructive culture cannot be overstated.

The dynamics of decision-making in response to these pressures underscore the need for a culture that can accommodate change and create innovative solutions. The structured process of project registration and resource allocation at DSB indicates a disciplined and strategic approach, which is a key aspect of its culture. This structured approach reflects in the day-to-day workload management, where projects are meticulously evaluated and aligned with the organization's strategic objectives. Such a culture of discipline and strategic focus is crucial for the effective management of complex and large-scale projects. The cultural disparities within DSB's IT department, especially post the integration of different software divisions, highlight the challenges of merging distinct cultures. A good culture within the IT department is vital for the smooth execution of daily tasks and the successful implementation of projects. The sense of detachment and lack of ownership over new

systems, as expressed by employees, point towards a cultural misalignment that can hinder day-to-day operations and overall project success.

The incident of the customer's project failing due to resource drain and lack of tangible outcomes is a testament to the importance of a unified culture in project delivery. This incident exemplifies how cultural misalignments can lead to inefficiencies and failures in meeting project objectives. It underlines the need for a culture where different departments share a common understanding and approach towards project management and execution.

So, the extent to which a good culture is important for DSB's day-to-day operations and its larger project development endeavours is significant. A culture that aligns with the organization's strategic goals, adapts to external pressures, and fosters a sense of unity and ownership among employees is important for DSB's success. This culture needs to permeate all levels of the organization, from top management to individual departments, ensuring that daily activities, interactions, and decision-making processes are consistent with the organization's core values and objectives. Such a culture not only enhances operational efficiency and project success but also contributes to employee satisfaction and engagement, which are key drivers of organizational excellence.

10. Conclusion

Our findings suggest that DSB's technostructures efficacy suffers from being poorly structured. Additionally, we perceive cultural weaknesses in the technostructure, in relation to the organization at large, which when strengthened could improve efficacy for DSB as a whole, and job satisfaction in the technostructure in general. Culture should specifically be modified to offset the customer/coworker discourse that we observed between the technostructure and the departments that it is works with, within DSB. This change, in conjunction with a restructuring of the technostructure into a horizontal and integrated unit would be beneficial in light of the ongoing IC5 project, which requires such characteristics of an organization. Additionally, as the IC5 project is already delayed by 2 years, these changes can help DSB mitigate the unfavourable consequences that delays, and planning shortfalls will bring with them in the long term.

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11.1. Appendices

Appendix A (First interview. Interview with an it-department leader)

Appendix B (Second interview. Interview with an it-department worker)