Critical Success Factors for Application of Business Intelligence in Distribution Sector in Denmark

Sabina Rolsted, Associate Professor
Zealand, Academy of Technologies and Business
Denmark
e-mail: saro@zealand.dk

Jesper Skjødt, Associate Professor
Zealand, Academy of Technologies and Business
Denmark
e-mail: jesk@zealand.dk

***Abstract*— This working paper explores the Critical Success Factors for application of Business Intelligence (BI) tools in the distribution sector, focusing on their impact on overall decision-making and strategic planning, data quality, and organizational culture. Through interviews with two distribution companies, the research confirms existing discussions regarding the success factors in implementation of BI technologies and its perceived benefits. Key themes emerged, including the enhancement of data-driven decision-making processes and strategic planning, the importance of data quality for effective BI utilization, and the cultural shifts towards a more analytical approach within organizations. The findings highlight that while the interviews reaffirm established knowledge on impact of applying BI in business, they also emphasis a holistic approach towards organizational development in optimizing operational efficiency and fostering a competitive edge in the distribution industry. This paper aims to contribute to the understanding of how BI can be leveraged to drive performance and adapt to evolving market demands.**

Keywords- Business Intelligence application; Business Intelligence in distribution sector; Data driven approach with BI

I. INTRODUCTION

In an increasingly competitive global marketplace, the distribution sector faces mounting pressures to enhance efficiency, reduce costs, and improve customer satisfaction. Business Intelligence (BI) tools have emerged as pivotal assets in this landscape, enabling organizations to transform vast amounts of data into actionable insights. Meanwhile, studies suggest Critical Success Factors (CSFs), such as management support, data capability, user involvement, competence development among others to be essential for BI success [1][2].

However, BI implementation is complicated and costly as it requires software, infrastructure, licenses, training and wages [1]. Similarly, in comparison to large enterprises, small & medium enterprises (SMEs) lack the main assets, such as the ability to build extensive sales network and the ease to obtain capital or a recognizable brand [3]. So, they might be reluctant or face challenges to integrate BI successfully.

On the other hand, SMEs in Denmark are considered to highly digitally mature as a study of level of digital maturity amongst EU countries showed that the most digitally developed SMEs were found in Denmark and Finland [4]. It is thus interesting to explore how the SMEs in Denmark have succeeded with digital transformation for instance with BI application and which factors have been critical.

Additionally, BI has been increasingly recognized as a key enabler of Supply Chain Agility, which allows businesses to respond dynamically to unpredictable market conditions [5]. Traditional supply chains often struggle with inefficiencies, rigid structures, and slow adaptability. By integrating BI tools in supply chain management (SCM), organizations can enhance real-time decision-making, demand forecasting, supplier management, and logistics efficiency**.** The ability to plan, source, make, deliver, and return goods efficiently is crucial for distribution companies, and BI provides insights that reduce uncertainty and optimize these processes [5]. In particular, BI supports SCM by improving flexibility, responsiveness, quickness, and competency**,** all of which are core characteristics of an agile supply chain. Given the importance of supply chain agility in today's volatile business environment, understanding how Danish SMEs leverage BI to achieve SCM efficiency can provide valuable insights into digital transformation best practices. Hence, this working paper explores the CSFs in integration of BI tools within the distribution sector in Denmark.

By analyzing case studies and interviews, we aim to highlight how BI application not only streamline operations but also foster a data-driven culture that empowers organizations to adapt swiftly to market changes. However, our goal is not to find generalizable, "One size fit all" manuals but rather provide a nuanced understanding of factors that can lead to BI tools success in shaping the future of distribution, offering valuable insights for practitioners and researchers alike by exploring the CSFs.

The next section presents the main research topic BI and the CSFs through related work with purpose to establish the context of the research. Section 3 presents the research design, followed by data analysis and finding in Section 4. Discussion is presented in Section 5 and conclusion is presented in the final section together with future perspectives.

II. RELATED WORK

BI implementations within an organization comprise many information systems that work together in an

integrated fashion to provide the user with the needed decision support [6]. It is an analytical, technology supported process which gathers and transforms fragmented data of enterprises and markets into information or knowledge about objectives, opportunities and positions of an organization [7]. Considering the large diversity of application areas as BI and corresponding software products, BI tools vary widely in terms of functionality, sophistication and complexity [7].

Although many organizations view BI as a purely technological investment, several internal and external factors affect its business value [1]. In this connection, several studies have discussed the critical success factors that are essential for a successful implementation of BI systems [3][6]-[9]. Understanding CSFs enables the BI users to optimize their scarce resources and effort by focusing on those significant factors that are most likely to aid successful system implementation [8] and to identify and prioritize both business needs and technical systems [1].

These researches focus largely on two different perspectives – technical/technology and business management [1][2][3][8]. Data capacity, user involvement, organization and competence development, strategy & decision making are some of the re-occurring themes in these studies, followed by several sub-areas such as information quality, data accessibility, system quality, user satisfaction, IT infrastructure, vision & strategy, organization culture, leadership, organization development, attitude towards change among others.

Deriving from these studies, the following four thematic areas were narrowed down for exploring the CSFs in this paper; Data accessibility & quality, Decision making processes and strategic planning, Benefits and impact of BI application on organization and Organization culture & practice.

III. RESEARCH DESIGN

This working paper employs a qualitative case study approach to explore CSFs for BI application within the distribution sector. The study method is selected for its ability to provide in-depth insights into complex phenomena within real-life context. The main objective of this paper is to explore the critical success factors for integrating BI within the distribution sector in Denmark.

Although the nature of this research is explorative, the related work provided the basis for developing an interview guide by identifying the thematic areas as a departure point. Data was collected through semi-structured interviews with key personnel from each company. The interviews varied from 30 minutes to approximately an hour, as the semi - structured interview provided the flexibility to have a conversation with the interviewee without rigid question-answer format. Not all questions were presented but the interview guide was used as a checklist during the interviews.

A. *Case study companies*

Two SMEs within the distribution sector, Danske Værktøjs Agentur (DVA) and Erik Larsen & Søn (ELS) with 36 and 12 employees respectively, were selected as case studies, based on their active use of BI tools and their willingness to participate in the research. Both companies supply tools and materials to B2B clients in construction industry mostly in Denmark and Scandinavia. DVA uses Power BI while ELS uses Qlik as BI tools.

We interviewed Jan Nielsen, Business and Data analytics Manager from DVA and Peter Brinkmann, CEO from ELS. Both interviewees have worked with their respective companies for more than 6 years. Both companies have a steady growth in the recent years and have been applying BI approximately for 5-6 years.

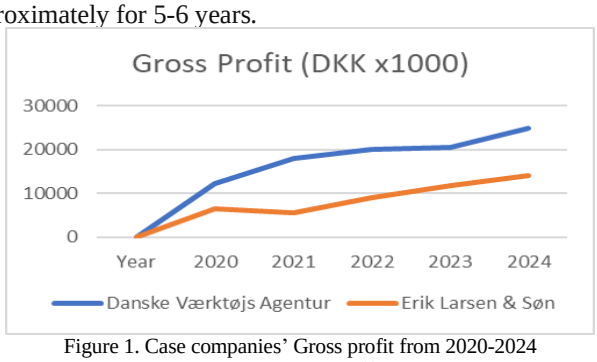

Figure 1. Case companies' Gross profit from 2020-2024
Source – www.proff.dk

IV. DATA ANALYSIS AND FINDINGS

Our data analysis provided a strong confirmation of established concepts regarding the application of BI and CSFs in business contexts. Here we present our findings using thematic areas identified through the literature review.

A. *Data accessibility and quality*

Both companies have had a tradition of systematic data approach even prior to the BI implementation although their approach to decision making has strengthened with the insights from BI. The interviewees acknowledged that the effectiveness of BI tools is contingent upon the integrity of the data being analyzed.

ELS have regular dialogue with the system developers to ensure smooth transaction and to solve problems and challenges and believe that easy access to both data and technology (technical help) to be essential for BI success.

Even though DVA seems to be impulsive when looking at their records of acquisition, Jan stresses on the fact that they ensure the compatibility of the outcoming data and do spend necessary resources before integrating to the existing database. Furthermore, they have a good relationship and cooperation with the BI system developers, so they can easily adjust their database and analysis tools whenever necessary with regular feedback and problem-solving mindset.

B. Decision Making and Strategic planning

Both companies emphasized the role of BI tools in enhancing decision-making processes. The ability to analyze real-time data allowed for more informed choices, reducing reliance on intuition alone.

The interviews revealed that BI tools are integral to strategic planning efforts. For instance, DVA plans its orders and deliveries through the system that monitors the current inventory and the flow/trends in the market, so that they do not run out of the supplies as well as the supplies do not take spaces for longer time than necessary. This releases time and resources for the managers while increasing operational efficiency.

At ELS, 4 managers have access to BI where they get updates and overviews on their goals, sales, revenue and employee performance, which is useful in decision making and problem solving. The insights also help them to provide better customer service, identify potential customers, plan work schedules for employees, investment, inventory management and marketing.

C. Benefits and Impacts of BI Application

The benefits of BI tools were evident in both organizations, particularly in terms of operational efficiency and enhanced customer satisfaction through better customer insights. Both companies have experienced substantial growth in recent years, which is visible in their bottom line as well as employee numbers. However, both interviewees pinpoint that their success in business is not exclusively because of BI tools application but rather a holistic and data-driven approach in overall decision making.

Furthermore, their customers are applying BI tools as well, making it possible to synchronize customer data with their internal data effortlessly and provide a faster and reliable service. Thus, both companies believe that their operational efficiency has increased through better overview of their supply chain and communication process has become effective, now that they have eliminated time consuming process of involving many communication channels.

D. Organizational Culture and Practice

Finally, the interviews shed light on the cultural shifts associated with BI adoption. Both companies reported a transition towards a more data-driven culture, where employees at all levels are encouraged to leverage BI tools in their daily practices. This cultural change is crucial for maximizing the potential of BI technologies, as supported by existing research.

There is increased awareness in using terms and terminologies that fit the customers' need and perception. With the BI insight, Peter and his employees at ELS have become conscious about words they use to describe their products appeal to the clients in their webshops instead of using technical specifications only, which may not be easily understood. He also mentioned that they keep an eye on which signage or texts are written in the vehicles their clients drive, so that they can match their clients' perception with the company's offer.

Similar pattern was noted at DVA. Their Salesmen use BI insights not just to sell the clients what they need at the moment but also to prepare the clients what they might need in the next step, so both DVA and their clients are several steps ahead with logistics planning and warehouse optimization, enabling company's supply chain agility.

V. DISCUSSION

Both case companies have experienced success and significant growth with the application of BI tools but they also acknowledge that one cannot single out BI tools but rather combination of various factors for their successful performance. However, the data driven focus has been a determining factor for both companies internally as well as externally with their clients.

Our findings confirm previously identified CSFs and emphasize the significance of holistic approach in decision making and strategic planning but the decisions will only be good, if the basis, i.e., data quality is good and is accessible to those involved in the process. Similarly, access to technical expertise such as system developers plays an important role.

Furthermore, organizational culture and practice evolve together with the use of BI. The case companies supply specialized products and have specific clients but being able speak/communicate in the language that is understandable to customers gives clear advantage. The ability to be proactive in planning not just own future plans but predicting the future needs with clients and being strategic give the companies a competitive edge, leading to more successful implementation of BI tools.

Both interviewees are adamant about the positive side of applying BI and did not reveal any problematic issues. This could of course be because there is no such issue and any challenge and obstacle they encounter, get easily solved. Perhaps being successful business, it is difficult to bring negative issues forward for case studies. However, it could as well be the pitfall of this research that the case companies perform well in general and are growing continuously. Had we looked into cases with poorer performance or history, our findings might have been different. Although finding managers willing to share stories of failure could be a challenge in itself.

Similarly, both interviewees are responsible for and are experienced users of BI, so they have good understanding and know-how of BI tools, can easily seek solutions when faced with problems and are also decision makers. The picture might have been different, if the interviewees were less experienced or are directly or indirectly influenced by the decisions made but are not involved directly.

VI. CONCLUSION

This research examines the CSFs for applying BI tools in the distribution sector through case study involving two SMEs catering to B2B clients within building and construction industry. It confirms existing discussions regarding the success factors in implementation of BI technologies and its perceived benefits, such as overall decision-making and strategic planning, data quality, benefits and impact of BI and organizational culture. But the CSFs discussed in this research cannot stand alone for harnessing the benefits from BI. The emphasis must still be on a data-driven, holistic approach towards decision making and strategic approach.

The insights gained will contribute to a deeper understanding of how organizations can effectively apply BI to drive performance and foster a culture of continuous improvement. Further research involving companies with negative experiences of applying BI could shed more light on how organizations can learn what not to do and not just what to do to get better success and competitive advantages of applying BI tools in the overall organizational development. Similar studies involving big, multinational companies could build upon the knowledge providing a list of Do's and Don'ts for integrating BI tools to benefit and succeed from such digital transformation.

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