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Research on the Impact of Data Analysis Ability on Enterprise Agile Transformation——The Case of Manufacturing Enterprises

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Abstract: *In recent years, with the rapid development of big data technology, data analysis ability has gradually become one of the core capabilities of enterprise competition. Data analysis capabilities can help companies better understand market needs, optimize product design, and improve operational efficiency. In the agile transformation of enterprises, the role of data analysis ability is more prominent. By analyzing a large amount of data, enterprises can more accurately grasp the market trend, quickly adjust their business strategy, and improve the market response speed. This paper explores the impact of data analysis capabilities in enterprise agile transformation. Data analysis capabilities help enterprises respond quickly to market changes, optimize the decision-making process, and improve operational efficiency. This paper provides theoretical support and practical guidance for enterprise agile transformation.*

Keywords: *data analysis ability; Enterprise agile transformation; Decision optimization*

1. Introduction

With the intensification of market competition and the acceleration of technological change, enterprises need to be more agile to cope with changes in the external environment. The agile transformation of enterprises has become an essential source of sustainable competitive advantage. In this process, data analysis capability, as an important management tool, plays a crucial role in the success of enterprise agile transformation.[1] With the intensification of market competition and the diversification of customer needs, more and more enterprises have become aware of agile transformation and are implementing it to adapt to the rapidly changing market environment. However, in agile transformation, enterprises often face many problems and challenges. This paper will discuss the main problems and challenges enterprises face in the agile transition period to provide a reference for the transformation practice of enterprises. This paper aims to study the impact of data analysis ability on enterprise agile transformation and provide theoretical support and practical guidance for enterprise agile transformation.

2. Definition and classification of data analysis capabilities

2.1 Definition of data analysis capabilities

Data analysis is a comprehensive ability to collect, organize, process, and analyze data to reveal the laws, trends, and relationships behind the data to support enterprise decision-making. Modern enterprises increasingly value this capability because it can help them better understand the market, optimize operations, improve efficiency, and create greater business value. The core of data analysis ability is to transform data into valuable information, which can guide the enterprise's decision-making, product optimization, and marketing activities. Specifically, data analysis capabilities involve multiple aspects, including data collection, cleaning, organizing, analyzing, visualizing, and interpreting (see figure 1).[2]

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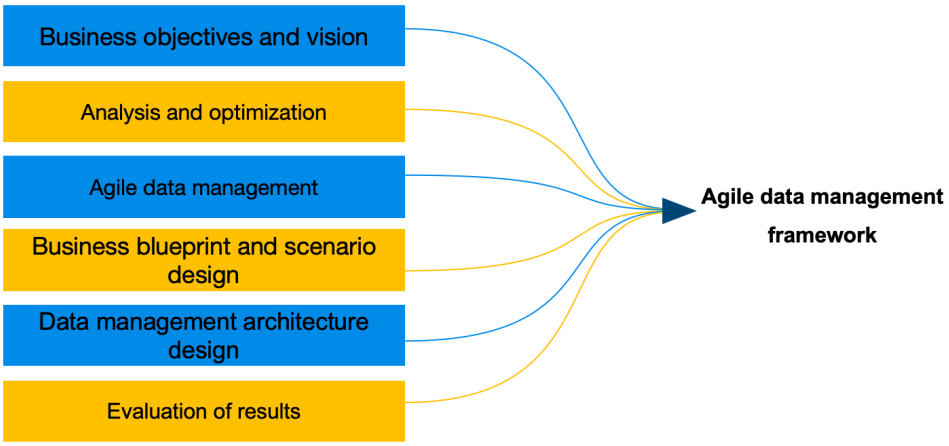

Figure 1: Agile data management framework

2.2 Classification of data analysis capabilities

2.2.1 Technical classification

From a technical point of view, data analysis ability can be divided into data acquisition ability, data processing ability, data analysis method, data visualization ability, and so on. Data acquisition capability refers to collecting data from various sources, including databases, social media, Internet of Things devices, etc. Data processing capability refers to the ability to clean, transform, integrate, and perform other pre-processing operations on the collected data to ensure the quality and accuracy of the data. Data analysis methods include statistical analysis, data mining, machine learning, etc. These methods are key tools to reveal the laws behind the data. Data visualization capabilities present analysis results in charts, reports, and more, making data easier to understand and communicate. [3]

2.2.2 Application classification

The application field mainly includes marketing analysis, that is, through consumer behavior analysis, market trends, and other data, to guide enterprises in formulating and optimizing marketing strategies. Operation management analysis is implemented to locate operation bottlenecks and improve operation efficiency through the analysis of enterprise operation data. Risk assessment analysis predicts potential risks by analyzing historical data and market dynamics and supports enterprises in formulating risk response strategies. Product optimization analysis refers to analyzing product usage data, user feedback, etc., to guide product optimization and improvement.

2.2.3 Business classification

The business level can be divided into: ①Strategic level analysis: analyze the macro market environment, competitors, etc., to provide support in decision making for enterprises to formulate long-term strategies. ②Tactical level analysis: analyze specific business scenarios, customer needs, etc., to guide the daily operation and decision-making of the enterprise. ③Operational level analysis: analysis of internal processes, employee performance, etc., to provide optimization suggestions for enterprise management.[4]

3. The formation logic of the agility of manufacturing enterprises

Data empowerment is a specific system based on the overall perspective, innovative data acquisition, analysis and utilization scenarios, technologies and methods, providing the necessary resources for capacity enhancement and value creation for the target of empowerment. Data empowerment enables enterprises to enhance the connection between people, information through data resources and capabilities, improve enterprise data acquisition, analysis and application capabilities (user behavior perception, dynamic resource allocation, flexible analysis services, etc.), drive the ability upgrade of manufacturing enterprises, and then obtain the value of empowerment. Through data empowerment, manufacturing enterprises obtain intelligence capability, connection capability and analysis capability, and driven by these three capabilities, they carry out data deconstruction of business processes, data correlation of business process and data reconstruction of business processes, and finally form agility of

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manufacturing enterprises (see figure 2).[5]

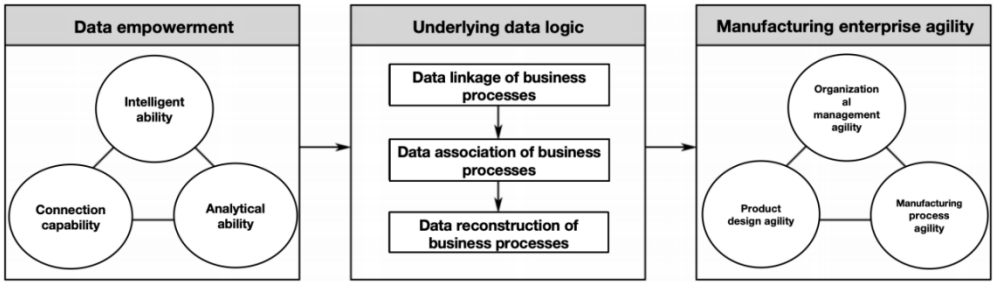

Figure 2: The formation logic of the agility of manufacturing enterprises

First of all, data empowerment is the driving factor for the formation of manufacturing enterprise agility. Through QR codes, social platforms, sensors, industrial robots, intelligent terminals and other intelligent network devices, operational data can be sensed and captured to help manufacturing enterprises obtain intelligent capabilities.

Secondly, data deconstruction, data association and data reconstruction of business processes are the underlying data logic to realize the agility of manufacturing enterprises. Data empowerment drives manufacturing enterprises to digitally express product design, production, and procurement to realize the data deconstruction of business processes.

Thirdly, organizational management agility, product design agility and manufacturing process agility are the specific embodiment of manufacturing enterprise agility. Through the expansion of inter-organizational cooperation, system framework and information management organizational management agility of manufacturing enterprises can be achieved.

Finally, data reconstruction is the direct path to realize agility of manufacturing enterprises. Driven by data empowerment, manufacturing enterprises carry out data deconstruction, data correlation and data reconstruction of their business processes, and the results of data reconstruction directly drives the formation of agility in manufacturing enterprises.

① Data reconstruction contributes to the modularity of product design solutions, module combination personalization, design process intelligence, and ultimately make product design agility can be realized; data reconstruction contributes to the production process, which is the most important factor in the agility of the manufacturing enterprise.

② Data refactoring contributes to the modularity of the production plant, modular production scale, production process intelligence, and modularity of raw material procurement and supplier functionality; data refactoring contributes to the product agility formation.

③ Data reconstruction contributes to product design process intelligence, production process intelligence, procurement process intelligence, making it so that the organization management agility can be realized.

4. The impact of data analysis ability on the agile transformation of enterprises

4.1 In-depth understanding of customer needs and market needs

Data analysis capabilities can provide more accurate market positioning, and data analysis can help enterprises deeply understand customer needs and market trends so as to carry out accurate market positioning and provide a clear direction for agile transformation. Additionally, through data analysis, enterprises can predict market changes and adjust product strategies and business models in time to adapt to the rapidly changing market environment.

4.2 Optimize the decision-making process

The application of data analysis in the agile transformation period of enterprises can strengthen data-driven decision-making, and data analysis can provide objective and accurate data support to help enterprises make fact-based decisions and improve the quality and efficiency of decisions. It can also quickly respond to market changes so that enterprises can quickly discover competitive dynamics and

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then quickly respond and adjust business strategies to achieve agile transformation.

4.3 Improve operation efficiency

By analyzing operational data, enterprises can identify the bottlenecks and problems in the business process to optimize and improve operation efficiency. At the same time, it can promote the optimization of resource allocation, help enterprises understand the utilization of resources, optimize resource allocation, improve resource utilization efficiency, and reduce operating costs.

4.4 Promote innovation and development

First, data analysis can reveal customer needs and preferences, support enterprise product innovation, and promote continuous product innovation and improvement. Secondly, through in-depth data analysis, enterprises can find new market opportunities and business expansion points, expand business areas, and improve market share and competitiveness. Finally, data analysis helps enterprises assess potential risks and predict possible problems so as to formulate effective risk management strategies and reduce the impact of risks on enterprises. Moreover, through data analysis, enterprises can predict market changes, customer demand, competitive situations, and other key information, providing strong support for corporate decision-making and improving the predictability and foresight of enterprises.

4.5 Improve teamwork ability

Cross-department data sharing is the main advantage of applying data analysis in enterprises. Data analysis can promote data sharing and collaboration among various departments within enterprises, break down information silos, and improve team collaboration efficiency. Moreover, data analysis can provide enterprises with real-time business feedback and data analysis results, help the team adjust the direction and strategy in time, and achieve rapid response and continuous improvement. In short, data analytics can help enterprises better respond to market changes and challenges and achieve agile transformation and sustainable development (see figure 3).

Figure 3: The positive impact of data analytics capabilities on enterprise agile transformation[6]

5. Problems and challenges faced by enterprises during the agile transition period

5.1 Lack of understanding of "Agile"

Many organizations do not have a deep understanding of agile transformation concepts and concepts remaining at the surface level. This makes it difficult to truly integrate agile concepts into daily management and business processes during the transformation process. Therefore, enterprises need to strengthen the study and research of agile transformation and an in-depth understanding of its core concepts and practices to ensure the smooth transformation progress. In addition, agile transformation is a long and complex process that requires strict schedule control at different stages. However, some enterprises are often delayed in the transformation process for various reasons, resulting in the transformation being blocked. In order to avoid this situation, enterprises should develop a reasonable transformation plan, clarify the goals and tasks of each stage, and strengthen team collaboration and communication to ensure the smooth progress of transformation.

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5.2 Corporate culture barriers

Corporate culture is an important factor affecting the agile transformation of enterprises. Some companies have long-established traditional attitudes and ways of thinking that conflict with the flexible, open, collaborative culture promoted by agile transformation. This causes companies to encounter cultural barriers during the transformation process, such as internal resistance, poor communication, etc. To overcome these issues, companies need to actively shape a corporate culture that matches agile transformation, encouraging employee engagement, open thinking, and innovation. At the same time, requirements management is a crucial part of agile transformation. However, some enterprises often deal with confusion and mismanagement, resulting in frequent changes in requirements and schedule delays in the transformation process. In order to solve these problems, enterprises should establish a sound demand management mechanism, clarify the process and method of demand collection, analysis, confirmation, and change, and ensure the standardization and effectiveness of demand management. At the same time, enterprises should also strengthen communication and collaboration with customers and users to ensure the accuracy and reliability of demand sources.

5.3 The enterprise is unable to develop a project program based on the realities of the situation

In agile transformation, some enterprises simply copy the transformation mode of other successful enterprises and fail to adjust flexibly according to their conditions. This makes it difficult for transformation projects to achieve the desired results and may even lead to failure. Therefore, in agile transformation, enterprises should fully understand their own situation, combine the market demand and competitive environment, and formulate feasible transformation plans to ensure the pertinence and effectiveness of the transformation. In the early stage of agile transformation, some enterprises often choose pilot projects as the starting point to explore the feasibility and effect of the transformation. However, after the pilot project's success, some enterprises failed to extend the successful experience to other projects or departments in a timely manner, resulting in a slow transformation process. Therefore, after the pilot project's success, the enterprise should summarize the experience and lessons in time and promote the successful experience to the whole enterprise to accelerate the transformation process.

5.4 Insufficient skills and support

Agile transformation requires enterprises to have higher skills and qualities, such as project management, teamwork, technical ability, etc. However, some enterprises often face the problem of insufficient skills and support in the early stage of transformation, leading to difficulties and setbacks in the transformation process. In order to overcome these problems, enterprises should strengthen the training and education of employees, improve the skills and quality of employees, and actively seek external support, such as the introduction of expert teams and participation in industry exchanges.

6. Suggestions for improving data analysis ability in the agile transformation period

6.1 Clear analysis objectives

Before conducting data analysis, companies first need to clarify the goals and objectives of the analysis. Only when the analysis goal is clear can enterprises collect data in a targeted way, choose the appropriate analysis method, and draw valuable conclusions. Therefore, enterprises should identify business needs and problems before starting data analysis and develop a clear analysis plan. At the same time, the use of advanced data analysis tools can greatly improve the efficiency and accuracy of data analysis; enterprises should actively introduce advanced data analysis tools and technologies, such as data mining, machine learning, big data processing, etc., in order to better process and analyze massive data. At the same time, enterprises should also strengthen the training and learning of employees to improve their ability to analyze data and their skill level.

6.2 Data quality management

Data quality is the basis of data analysis. Companies must ensure that data is accurate, complete, and consistent to produce reliable analysis results. To this end, enterprises should establish a data quality management system, including data verification, cleaning, integration, and standardization processes, to

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ensure that the data quality meets the requirements of analysis. In agile transformation, enterprises need to integrate internal and external data resources to better understand the market, customers, and competitors. Enterprises should establish a unified data platform to integrate and standardize data from various sources for analysis and comparison. At the same time, enterprises should also strengthen data sharing and cooperation with other enterprises to obtain a wider range of data resources.

6.3 Data visualization

Data visualization is an important means of presenting data analysis results to users intuitively and understandably. Enterprises should adopt appropriate data visualization tools and technologies to present analysis results in charts, reports, etc., to help users better understand the data and conclusions. At the same time, enterprises should continuously optimize the effect of data visualization and user experience based on user needs and feedback. In addition, in the process of using data analysis technology, enterprises need to pay attention to data ethics. Enterprises should ensure the legality and compliance of data analysis work and protect the privacy and rights of users. At the same time, enterprises should also establish norms and systems for data use and sharing to ensure data security and controllability.

6.4 Continuous learning practice

Data analysis is a process of continuous learning and practice. Enterprises need to constantly pay attention to new data analysis technologies and methods, strengthen the learning and training of employees, and improve the data analysis ability and skill level. At the same time, enterprises should actively apply data analysis to the actual business and constantly test and improve the methods and processes of data analysis through practice. In the process of agile transformation, data analysis often requires the cooperation and coordination of multiple departments and teams. Enterprises should establish an effective cooperation mechanism to clarify the responsibilities and ways of collaboration of various departments to ensure the smooth progress of data analysis. At the same time, companies should also strengthen communication and collaboration with external partners to jointly promote the development of data analytics.

7. Conclusion

With the deepening of agile transformation of enterprises, the importance of data analysis ability is becoming increasingly prominent. In the process of agile transformation, improving the ability of data analysis to better respond to market changes, optimize operational strategies, and enhance competitiveness has become an important issue for enterprises. The results show that the ability of data analysis can significantly promote the agile transformation of enterprises. In order to improve the agility of enterprises, enterprises should attach importance to the construction and application of data analysis capabilities and incorporate them into corporate strategic planning and business decision-making. At the same time, the government and all sectors of society should also strengthen the support and guidance of data analysis capabilities and promote enterprises to achieve high-quality development.

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