Original Research Article

Exploration of collaborative supply chain management models for small and medium-sized enterprises under digital transformation

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Abstract: with the rapid development of digital technology,small and medium-sized enterprises(smes)are facing significant opportunities and challenges in digital transformation.in terms of supply chain management,digital transformation provides new ideas and means for smes to achieve collaborative supply chain management. this paper analyzes the impact of digital transformation on the collaborative supply chain management of smes,discusses the problems faced by smes in this process,and then proposes corresponding collaborative management models and implementation strategies.the aim is to help smes enhance supply chain collaboration efficiency and market competitiveness through digital power,achieving sustainable development.

keywords: Digital transformation; Small and medium-sized enterprises; Collaborative supply chain management

In the current era of globalization and informatization,market competition is becoming increasingly fierce,and collaborative management of the supply chain has become the key for enterprises to gain competitive advantages.as an important component of the national economy,small and medium-sized enterprises play an indispensable role in promoting economic growth and employment.however,compared to large enterprises,small and medium-sized enterprises often have certain limitations in resources,technology,and management,and face many challenges in supply chain collaborative management.

1. The impact of digital transformation on collaborative management of supply chains for small and medium-sized enterprises

Digital transformation brings multiple positive impacts to the supply chain of small and medium-sized enterprises.firstly,information sharing is more timely and accurate.traditional supply chain information transmission has problems such as lag,inaccuracy,and poor communication.nowadays,with the help of information technology,a unified platform can be built to collect,integrate,and share various types of information such as procurement and inventory in real time.iot technology can track the status of goods,making it easier for all parties to make accurate decisions based on information and avoiding inventory backlog and shortages.secondly,process optimization and collaborative efficiency improvement,digital technology can automate and intelligently transform business processes,rpa can handle repetitive work to reduce manual errors,big data analysis can help identify bottlenecks and optimize processes,shorten delivery cycles,and improve response speed.thirdly,the risk management capability has been enhanced.faced with various risks such as market fluctuations,data analysis can be used to plan and establish evaluation systems to monitor suppliers,and blockchain can be used to ensure the authenticity and security of information and prevent risks.

2. The problems faced by small and medium-sized enterprises in supply chain collaborative management under digital transformation

2.1. Weak digital foundation

Many small and medium-sized enterprises are limited by their financial and technological strength,with incomplete information infrastructure construction and a lack of advanced hardware equipment and software systems.for example,some enterprises have insufficient network bandwidth to support the application of technologies such as big data;the internal information systems of enterprises are often isolated,unable to effectively connect with upstream and downstream enterprises,hindering the smooth flow of information and the development of collaborative management.

2.2. Data security and privacy issues

In the process of digital transformation,a large amount of data is shared and transmitted between various links in the supply chain,and data security and privacy protection have become important concerns.due to the lack of professional security protection technology and talent,small and medium-sized enterprises are prone to risks such as network attacks and data leaks.once a data security incident occurs,it not only affects the operation of the enterprise itself,but may also damage the interests of the entire supply chain partners.

2.3. Talent shortage

Digital transformation requires composite talents who understand both supply chain management and digital technology knowledge.however,small and medium-sized enterprises often find it difficult to attract and retain such high-quality talents.existing employees have limited mastery of digital technology and face difficulties in operating and applying new digital tools for supply chain collaborative management,which affects the speed and effectiveness of digital transformation.

2.4. Differences in digitalization levels among partners

There are numerous supply chain partners for small and medium-sized enterprises,and the progress and level of digital transformation vary among them.some suppliers or distributors may still be stuck in traditional operating models,unable to effectively connect and collaborate with small and medium-sized enterprises undergoing digital transformation,which limits the construction and optimization of the entire supply chain collaborative management model.

3. Collaborative management mode of supply chain for small and medium-sized enterprises under digital transformation

3.1. Building a collaborative supply chain management model based on cloud platform

Cloud platforms have the advantages of low cost and strong scalability,making them suitable for the resource situation of small and medium-sized enterprises.by building a cloud based supply chain collaborative management platform,small and medium-sized enterprises can store data from various links such as procureme nt,production,sales,and logistics in the cloud,and achieve sharing and collaborative operations with partners.for example,enterprises can publish real-time order requirements on cloud platforms,and suppliers can obtain and respond in a timely manner.at the same time,logistics companies can arrange delivery plans based on orders,and all parties can communicate and coordinate in real time through the cloud platform to improve the overall

operational efficiency of the supply chain.

3.2. The collaborative decision-making model of supply chain driven by big data

Big data analysis can help small and medium-sized enterprises uncover the value behind supply chain data,providing strong support for collaborative decision-making.enterprises can collect and integrate internal and external market and industry data,predict customer demand,optimize inventory levels,and evaluate supplier performance through data analysis.for example,based on historical sales data and market trend analysis,the production quantity and replenishment time of products can be accurately determined.at the same time,based on the supplier's on-time delivery rate,product quality,and other data,higher quality partners can be selected to achieve scientific and accurate supply chain collaborative decision-making.

3.3. Supply chain collaborative trust model secured by blockchain

Blockchain technology can establish an immutable and traceable trust mechanism in the supply chain.small and medium-sized enterprises can use blockchain to record the entire process information of products from raw material procurement to final sales,including sources,production and processing links,logistics trajectories,etc. all participating parties can view this information at any time to ensure the authenticity and quality safety of the product,and enhance trust between partners.for example,in the food supply chain,consumers can query the source and production process of food through blockchain,and businesses can better collaborate based on this trust,reducing communication costs and transaction risks caused by trust issues.

4. Strategies for implementing supply chain collaborative management mode under digital transformation

4.1. Strengthen the construction of digital infrastructure

In order to adapt to the development trend of the digital age,small and medium-sized enterprises must attach importance to and increase their investment in information technology hardware and software.this includes but is not limited to increasing network bandwidth to ensure efficient data transmission;update and replace outdated equipment to maintain the progressiveness of technology;and based on the characteristics and needs of their own business,choose appropriate information systems,such as enterprise resource planning(erp) systems,customer relationship management(crm)systems,etc.these systems can not only help enterprises better manage internal resources and optimize customer relationships,but also provide a solid technical foundation for supply chain collaborative management by gradually achieving integration between systems and docking with external partners,thereby improving the efficiency and response speed of the entire supply chain.

4.2. Strengthen data security management

In the process of digital transformation,enterprises must recognize the importance of data security and take a series of measures to strengthen data security management.firstly,enterprises need to establish a comprehensive data security management system to ensure that data security is regulated and traceable. secondly,equipped with professional security protection technologies and tools,such as firewalls,encryption software,etc.,these are the first line of defense to protect enterprise data from external threats.in addition,regular data security training is provided to employees to enhance their awareness of data security and make every employee a guardian of data security.at the same time,sign data security agreements with partners to clarify the responsibilities and obligations of all parties in data protection,jointly maintain the security and privacy of

supply chain data,and ensure the stability and reliability of the entire supply chain.

4.3. Cultivate and introduce digital talents

In the current wave of digital transformation,small and medium-sized enterprises are facing unprecedented opportunities and challenges.in order to adapt to this trend,enterprises must attach importance to the cultivation and introduction of digital talents.on the one hand,enterprises can systematically enhance the digital technology literacy of existing employees through internal training,online learning platforms,and professional courses.this not only includes proficient use of basic digital tools,but also a deep understanding and practice of supply chain management capabilities.through this approach,employees can master new digital tools and methods,thereby improving work efficiency and quality.on the other hand,enterprises need to actively introduce composite talents with digital expertise and supply chain management experience.these talents can bring new perspectives and innovative thinking to enterprises,driving them further on the path of digital transformation.in order to attract these talents,enterprises should provide competitive salary and benefits,broad career development opportunities,and a good working environment,thereby providing a solid talent guarantee for the digital transformation and supply chain collaborative management of enterprises.

4.4. Promote digital synchronization among partners

In the process of digital transformation,small and medium-sized enterprises not only need to focus on their own development,but also attach importance to collaboration and synchronization with supply chain partners. enterprises should actively communicate and exchange ideas with their partners,share their experiences and benefits of digital transformation,in order to promote the common progress of the entire supply chain.through this approach,it can stimulate partners'enthusiasm for digital transformation and encourage them to accelerate their own digital processes.in addition,small and medium-sized enterprises can help their partners improve their digital capabilities by organizing joint training,providing technical support,and consulting services.this not only enhances the competitiveness of partners,but also ensures the synchronous development of the entire supply chain in digital transformation,providing a solid foundation for the effective implementation of collaborative management models.

5. Epilogue

The digital transformation has brought unprecedented opportunities for collaborative management of supply chains for small and medium-sized enterprises.by building appropriate collaborative management models and adopting effective implementation strategies,small and medium-sized enterprises can overcome their own limitations and enhance the collaborative efficiency and competitiveness of their supply chains. however,this process is not achieved overnight.small and medium-sized enterprises need to continue to pay attention to the development trends of digital technology,continuously invest resources in improvement and optimization,and strengthen cooperation with supply chain partners to jointly address various challenges in digital transformation,achieve sustainable development in the digital wave,and contribute to the high-quality development of the economy.

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