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ORIGINAL ARTICLE

Supply chain optimization based on chain management and mass customization

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Abstract

In this paper, the synchronous supply chain management information system for mass customization in e-commerce is studied. The principle of chain management and the mechanism of mass customization in e-commerce are discussed. It is pointed out that chain management aims at chain value. Secondly, the paper explains the mechanism of chain management, and points out that chain management improves the value of chain by establishing modular operation units, identifying and managing bottlenecks, identifying and eliminating waste under the action of collaborative planning and control. This paper discusses chain management from the strategic point of view, and draws a conclusion that the mass customization operation management system based on chain management has the characteristics of sustainable competitive advantage. Finally, the process description system of implementing chain management is given, and the dynamic collaborative scheduling optimization of MC e-commerce in supply chain environment is also given. The practical case analysis shows that the method designed in this paper has a good practical effect.

Keywords Mass customization · Supply chain optimization · E-business · Chain management · System design

1 Introduction

Mass customization (MC) is the mainstream production mode in the 21st century. A key issue in MC research is how to solve the contradiction between "scale effect" and "customer individual demand" (Peeples 1993). The key contradiction between how to deal with mass production effects and customization needs is the key issue of mass customization (MC) (Silveira et al. 2001). In order to gain a competitive

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advantage in rapidly changing customer needs and a highly competitive business environment, manufacturers are forced to offer customized products and services that are close to mass production at a reasonable price (Kotha 1994). Mass customization capability (MCC) has become an important competitive factor in meeting customer needs in a cost-effective manner. Finding ways to enhance MCC is of great interest to researchers and practitioners (Huang et al. 2010).

The SCS in the MC is very complicated and has its own particularity, which is mainly reflected in two aspects. One is the complex relationship between the random information from the customer order and the supply chain partner, which can lead to many complicated scheduling contradictions and bring dynamic or random features; the other is in this complex environment, the cooperation benefits and The outstanding relationship of risk. Therefore, we must explore how to deal with these characteristics and analyze the collaborative benefits and risks in MC (Yao 2013). Mass customization (MC) usually means the value chain of participants with several spatial distributions that require extensive coordination (Sugumaran et al. 2006).

As a comprehensive management concept, the core meaning of supply chain management is to fully understand customer and market needs, keep pace with suppliers and other partners, and achieve resource sharing integration. Coordinate and support the coordinated operation of all companies in the supply chain to achieve the overall best performance level and improve the overall competitiveness of the entire supply chain (Arbaugh 2014). Supply chain management and customer relationship management are concepts that optimize the provision of goods to customers (Becker et al. 2003). Unlike previous corporate management, supply chain management is geared toward distribution and independent stakeholders. Although stakeholders are related to each other, there are self-interests and information privacy in practice. Therefore, supply chain management is not only an extension of corporate management, but also the choice, interaction, coordination and coordination among stakeholders (Klug 2016). Social and technological factors will affect the ability of enterprises to improve the quality of partnerships and improve the level of supply chain integration (Lin 2014). The large-scale characteristics of supply chain networks, the dynamic characteristics of supply chain structure, the self-interest characteristics of supply chain units and various inputs/The random nature of the output process determines that supply chain management is a very complex process.

With the development of network and computer technology, the concept of supply chain management is constantly improving, and advanced supply chain management modes such as agile supply chain and virtual supply chain (electronic supply chain) are emerging endlessly (Sahay et al. 2014). Computers and web platforms provide powerful tools for interaction, coordination and decision support between supply chain enterprises. However, the so-called supply chain network management is still in the data sharing stage, and the interaction and cooperation between enterprises is insufficient (Kazemian and Aref 2016). Collaboration is a fairly broad term that means different things to different people. Detailed categorization and analysis of such collaborative activities is needed to provide some clarification and basis for further research (Wang and Archer 2004). Electronic collaboration and its impact create a one-sided benefit for the upstream side of the chain: the overall efficiency of electronic collaboration tools is more

influential when used with suppliers, and is more beneficial when used with customers (Lefebvre 2003). How to connect the information system of the supply chain enterprise through the network platform, establish a supply chain management decision support platform, further realize collaborative decision-making and scheduling (not necessarily fully shared) on the basis of information sharing, and improve the speed and operating cost of the response capability supply chain. Reducing has become a research hotspot in current supply chain management. Therefore, this paper focuses on the e-commerce synchronous supply chain management information system for mass customization.

The paper is organized as follows. Part 2 introduces the research on mass customization supply chain in mobile environment. Part 3 analyzes the mass customization operation management system based on chain management. Part 4 describes the MC e-business dynamic collaborative scheduling in supply chain. Section 5 gives the conclusion.

2 Research on mass customization supply chain in mobile environment

2.1 The meaning and characteristics of mass customization

1. Customized production. The handicraft workshop before the industrial age adopted a typical customized production mode. The customer requests, the owner designs and builds products according to the requirements. It is generally believed that the core idea of customized production is: by providing customers with personalized products at acceptable delivery time and price, not only win customers, but also effectively realize the production mode of enterprise market competition objectives. For custom-made producers, the core is to organize production according to market driven (Liu 2013).
2. Mass production. It is generally believed that mass production is a profitable mode of production by adopting standardized methods to reduce costs by increasing production batches, that is, mass production is the premise of reducing costs. Ford reversed this conclusion, saying that low cost is the premise of mass production. He pointed out: “We will reduce the price in the first place, and the principle is to expand the market, while strictly ensuring the best product quality. We didn’t think of a cost as a constant cost, so we initially lowered the price to the point where we could increase sales to make cars affordable to anyone who built them.
3. Mass customization. Since 1987, Start Davis first proposed the concept of mass customization. Mass customization includes the following meanings: to meet individual needs; to achieve the speed and cost of mass production; is a new mode of production; with a win-win goal (Table 1).

In this paper, mass customization is defined as a mode of production, which can provide products or services to meet the requirements of customization with

Table 1 Comparison between mass customization and mass production

Comparison project	Mass production	Mass customization
Target	Develop, produce, sell and deliver products at low prices that everyone can afford	Develop, produce, sell and deliver affordable products and services
Focus	Achieve high efficiency through stability and control	Achieve diversification and customization through flexible and quick response
Management thought	Product centered	Customer centered
Production driven mode	Arrange production promotion mode according to market forecast	Pull mode according to order arrangement
Strategy	Cost leadership strategy	Differentiation strategy
Scope of application	Stable demand and unified market	Dynamic demand and discrete Market

the quality, speed and cost close to mass production, and realize the operation objectives by improving customer value through dynamic integrated collaborative process. The formula can be expressed as:

Mass customization capability = F (price capability, quality capability, responsiveness, variety capability).

First, mass customization is different from traditional custom-made production, emphasizing its quality, cost and speed. When mass production is the mainstream, these benefit indicators of mass customization are generally lower than mass production. Only when the customization demand becomes the mainstream, its indicators will be superior to mass production. Second, mass customization differs from mass production in the face of personalized needs, which can be tangible products or intangible products, usually a combination of tangible and intangible products (Dubey 2016; Alfirevic et al. 2015). Third, unlike lean production, too-mass customization creates target capabilities by integrating the capabilities of different links. Fourthly, unlike mass customization and customization, mass customization achieves profit objectives by satisfying customers, which is embodied in the level of customer value, including quality, price, speed and variety.

If the goal of mass production is to develop, produce, sell, and deliver products and services at a price that almost everyone can afford. The common goal of mass customization companies, then, is to develop, produce, sell, and deliver affordable products and services that are sufficiently diverse and customized for almost everyone to buy what they want. It has the following characteristics (Liu and Yao 2018):

1. Customer demand oriented.
2. Take agile as a sign.
3. Quality is the prerequisite.
4. It is supported by information technology.
5. Based on modularity and standardization.
6. Cooperation is the means.
7. Management innovation is the key.

2.2 Characteristics of mass customization supply chain

Mass customization provides a new way for enterprises to improve their competitiveness, at the same time, it also puts forward many new challenges to the traditional production and management mode of enterprises. This idea and economic benefits of mass customization can not be realized only by a single enterprise under the traditional concept of strategic competition. It must rely on the cooperative use of external resources and enterprises' own resources. In order to realize the personalized products required by mass customization quickly and cheaply on the basis of traditional limited resources, enterprises must quickly complete the design, trial-manufacture, production and marketing of customized products. Extreme individualization will make the whole implementation process with a huge amount of business information and process complexity. The timeliness of market demand will force the whole design and production cycle to be shortened, which further

aggravates the difficulty of implementing the concept of mass customization. Enterprises must break through their constraints on available resources and change the traditional concept of strategic competition. Supply chain management as a feasible way to achieve mass customization has aroused widespread concern and attention. As a new strategic mode of operation, supply chain provides a strategic and practical outlet for the realization of mass customization.

However, there is a huge difference between mass production and mass customization. Therefore, supply chain management for mass production is not suitable for mass customization. In the process of mass production transforming into mass customization, many foreign enterprises fail to establish a supply chain management mode suitable for mass customization, which leads to a substantial increase in cost and a sharp decrease in efficiency (Kumar 2016). Therefore, the implementation of mass customization mode must be supported by the corresponding supply chain management mode. Different from the supply chain in mass production mode, mass customization supply chain has the following characteristics:

1. The aggravation of information flow.

In mass customization mode, suppliers, manufacturers and main enterprises need more accurate and rapid access to customer demand information, and information exchange between them is becoming increasingly important, so information flow becomes the most important factor. In addition, in order to gain competitive advantage, a number of manufacturers and suppliers with complementary core competencies form dynamic alliances. In order to achieve information integration of the whole supply chain, the role of information flow is further aggravated. Based on this point, this paper focuses on information interaction.

2. Demand driven supply chain mode.

The supply chain of mass customization is a supply chain based on demand pull and push pull. The bullwhip effect in supply chain is smaller than that in Supply Chain Based on customer demand. In large-scale production, the bullwhip effect will occur when each node in the supply chain orders and produces according to the predicted data. In mass customization (MC) production, the production and sale of the final product is arranged entirely according to the order of the final customer. Therefore, in the latter stage of MC supply chain, the supply chain is market demand-driven, not production-driven, thus reducing the bullwhip effect caused by demand forecasting in the supply chain.

3. Dynamic and agility.

In order to seize market opportunities, enterprises need to choose suppliers and manufacturers to form dynamic alliances according to their core competencies. The supply chain structure changes with the change of market demand, so that the supply chain presents dynamic characteristics.

In mass customization mode, the main enterprise arranges the production of customized products based on customer orders, which has a time disadvantage compared with the mode of demand forecasting in mass production (Smith 2013). Therefore, providing customized products to customers quickly and cheaply is the focus of supply chain management under mass customization mode. For these reasons, the mass customization supply chain is a agile supply chain based on lean basis.

4. Information technology intensive.

The implementation of mass customization needs the support of modern information technology and advanced manufacturing technology. Only when the information technology and e-commerce represented by Internet are popularized, flexible manufacturing systems and computer integrated manufacturing are widely used, mass customization can give full play to its advantages. Therefore, the mass customization supply chain is an information technology intensive supply chain.

5. Structural adjustment.

In order to meet the needs of customer-driven production and enterprise alliance, as well as the development of information technology, manufacturers can directly interact with customers as the main enterprise. As a result, the role of distributors and retailers has been weakened or even disappeared, leading to the gradual transformation of the supply chain structure into an open network composed of suppliers, manufacturers and customers, as shown in Fig. 1. The manufacturer contacts the customer directly to achieve a wider range of information exchange, thus obtaining more accurate demand information. Moreover, the supply chain of mass customization is mainly demand-driven, so the order of supply chain nodes should also be described in a reverse way.

3 Mass customization operation management system based on Chain Management

3.1 Process description of management system

As an artificial system, the operation management system based on chain management also has a life cycle. It consists of strategic positioning, system establishment, system operation, system evaluation and system adjustment. The effective operation of the management system includes the following links in the system cycle process (Ng et al. 2015):

1. Determine the target strategy. The implementation of mass customization operation management based on chain management involves strategy formulation first. The following tasks need to be done: determine the system goals. There is no uniform requirement for mass customization as a mode of production. Different

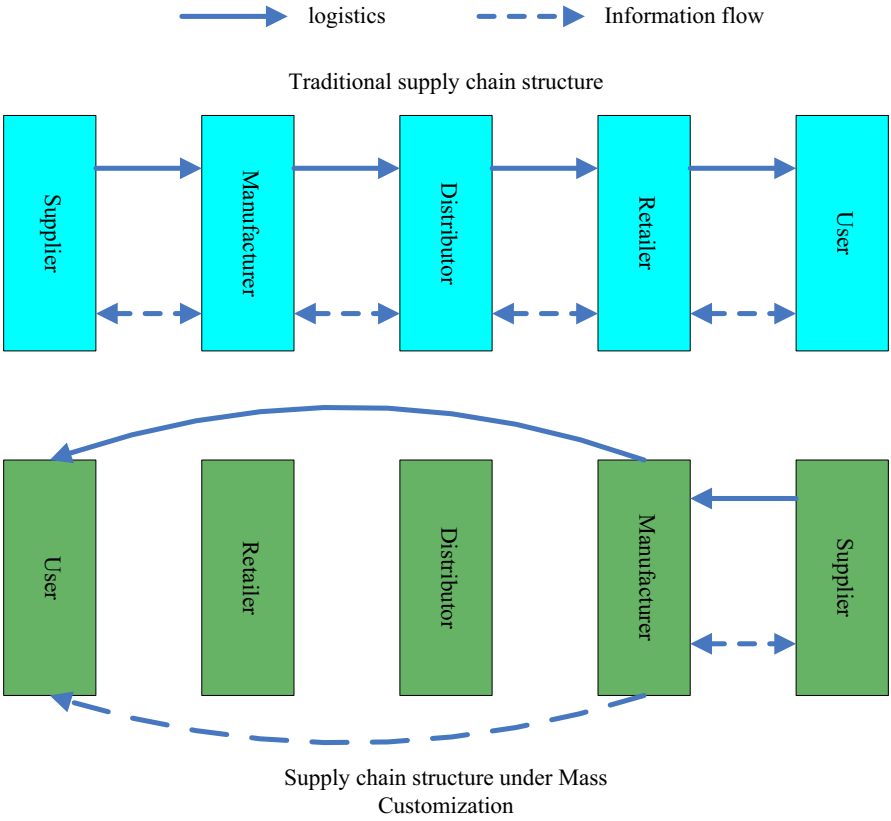

Fig. 1 Changes in the structure of mass customization supply chain

organizations need to set appropriate goals according to their own internal and external environment. This goal is gradual. If there is no unification of management's ideas in the decision-making of larger strategic choice and adjustment, it will not only be unable to overcome the obstacles in the process of consolidation, but also often form various management conflicts. Examine corporate culture. Corporate culture is an important component of an organization's strategic competitive advantage. Given the unique characteristics of an organization, corporate culture can even become a decisive factor for strategic success. Forming a strategic plan. On the basis of unified thinking, the implementation of strategic objectives that do not conflict with corporate culture is likely to be successful, and the strategic plan needs to be fully demonstrated.

2. Build management system. Establishing a mass customization operation management system based on chain management involves the comprehensive transformation of the existing organization. Firstly, a scientific and feasible organizational transformation scheme should be formulated, which should be consistent with the strategic objectives in organizational form, organizational process and organiza-

tional operation rules. Secondly, in order to minimize the resistance to transformation and promote the process of transformation, it is necessary to train people at different levels and posts on new ideas, new rules, new knowledge and new skills to create staff security. Thirdly, internal organizational transformation, such as organizational adjustment, personnel adjustment, facilities adjustment, to ensure that the formation of a reconfigurable resource system. Finally, the establishment of mass customization operation management system based on chain management requires the formation of dynamic capabilities with other organizations and the collaborative management of its operation process, so the transformation of external organizations is one of the keys to ensure the effectiveness of the system.

3. Management system operation. In order to implement mass customization operation system based on chain management, a lot of and regular work is to manage its operation process. Its contents include: requirements identification management, preparation process management, manufacturing process management and after-sales process management. Different from the traditional operation system management, the internal needs to focus on the management of each node capacity and its ability combination, and the external needs to focus on the management of cooperation between organizations and seamless convergence. In this process, the management of product development process belongs to the preparatory process management. The development process not only becomes one of the key points of management, but also has many new characteristics of activities. New management concepts and methods are needed. The management of manufacturing process is more related to planning, plan execution and process control. At this time, outsourcing decision-making, modular capacity building and management and so on become new issues for managers.
4. Evaluate system performance and system reengineering. The performance of the evaluation system mainly includes: preparation for performance evaluation, establishment of evaluation model, analysis of evaluation results and disposal of evaluation results. In the evaluation process, we should pay full attention to the level of business indicators related to chain value, and pay full attention to the three themes of transport bud management system: quality, cost, delivery time, which directly reflect the effect of operation management, and pay full attention to the relationship between indicators. Systematic reengineering mainly includes: recognition of reengineering objectives, decision-making of reengineering preparation, reengineering implementation and management, and revision of strategic objectives. In this process, through continuous reengineering, we can support the continuous approach to the established management objectives, and constantly optimize the organization's operational management system. According to the level of the organization's endurance, we can choose radical reengineering and gradual reengineering.

This article uses the international popular stage activity framework (s A) to illustrate this system. Each phase of the framework assigns a variety of activities, with Sj for Phase I and Aj for Phase j, then Si-Aj for Phase I. The system model is shown in Fig. 2.

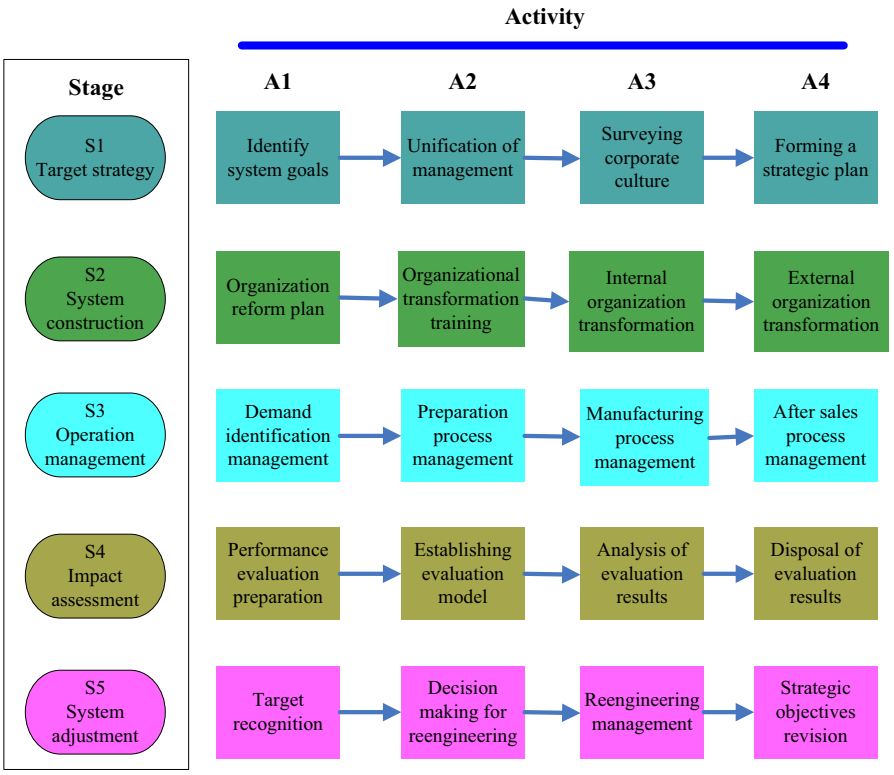

Fig. 2 S-A based large scale operation management system based on chain management

3.2 Constitution of mass customization system based on Chain Management

The composition of mass customization operation management system based on chain management is shown in Fig. 3. From the diagram, the system's goal is to maximize the chain value. The system process is the system life cycle process, which includes three parts: the system establishment process, the system operation process and the system adjustment process. The system mainly performs three functions: quality chain management, cost chain management and time chain management. Its supporting foundation includes three parts: the chain management principle and its management principle, the chain management software and hardware environment construction and the chain management method system.

3.3 Chain management functions and attributes

One-way power management refers to a series of activities to allocate organizational resources. Its purpose is to achieve organizational goals more effectively and efficiently. By creating an environment in which employees work hard together,

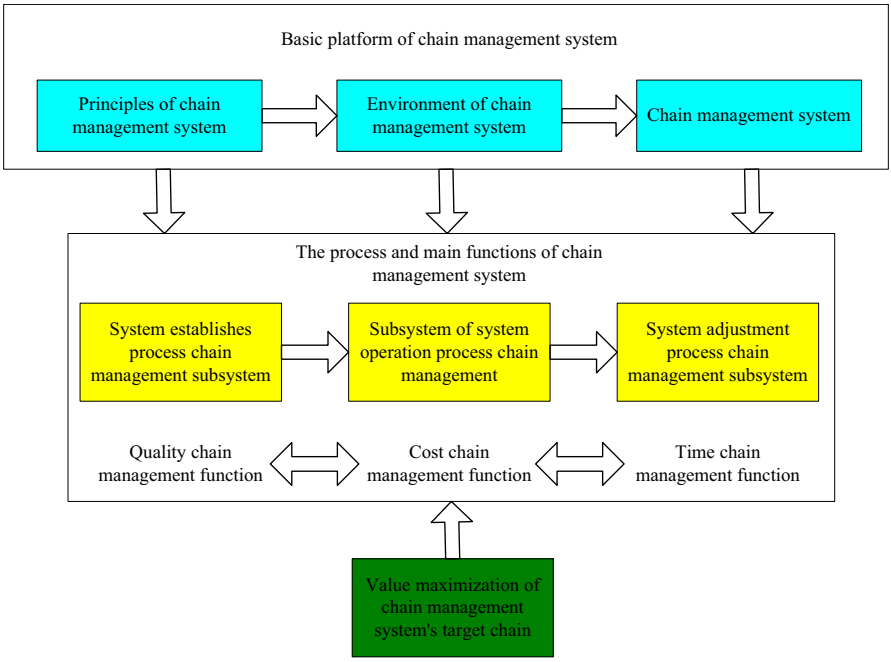

Fig. 3 Mass customization operation management system based on chain management

everyone can contribute to the achievement of organizational goals with minimal resource consumption. It has the characteristics of planning, means and purpose. Interactive learning management refers to a series of interactive activities whose purpose is to create more value. By creating continuous recognition and interaction process, everyone's value creation activities can be guaranteed. It has: design, guarantee and value. The functions and attributes of chain-based management are mainly as follows: from the single power model to the interactive learning management paradigm. In this process, the management functions and the essential attributes of management will change correspondingly.

Chain management emphasizes the value and interaction of management, and its management function has obvious new characteristics. The chain management functions include: design, link, guarantee and guidance. As shown in Fig. 4.

One hand, chain management emphasizes the construction and management of modular resources, and on the other hand, it emphasizes the protection, development and utilization of intellectual resources. The main functions of management are from focusing on command and control to focusing on protection and orientation.

Management functions are generally divided into several relatively independent parts according to the internal logic of the management process. The significance of dividing management functions is that it can clearly describe the whole process of management activities. In fact, the behavior subject of management is organization, and the organization is a movement change. When the organizational elements such as organizational environment, management subject and management object

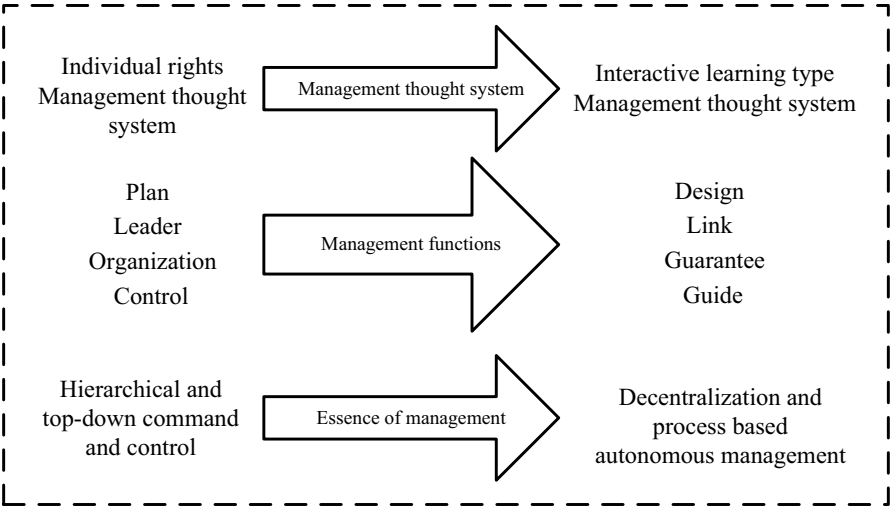

Fig. 4 Transformation of management functions and management attributes

change, the management behavior and function should change accordingly. Chain management differs from traditional management in that its management functions are transformed from planning, organizing, leading and controlling into designing, linking, ensuring and guiding.

Design function. The design here refers to raising and constructing the resource elements that conform to the requirements of the system. The purpose of effectively fulfilling this function is to find and build the node capacity to meet the requirements for the organization, and dynamically adjust it. Self-organization refers to the related activities that integrate related resource nodes into a whole cooperative work according to the requirements of system output. Safeguard function. The guarantee here refers to the arrangement and control of managers' activities in order to effectively achieve the established goals. At this time, the function of the function is to provide corresponding services for employees. Orientation refers to activities that guide consumers, partners, and employees of an organization to achieve the goal of continuous improvement.

4 MC e-business dynamic collaborative scheduling optimization in supply chain

4.1 Research on dynamic scheduling of MC supply chain under information sharing environment

Ant colony algorithm is a heuristic random search method. Like other heuristic algorithms, the optimal solution is found through the group evolution process composed of candidate solutions. The method was initially applied to the famous traveling salesman problem (TSP) and achieved good results. Positive feedback,

distributed and greedy heuristic search of ant colony algorithm ensure the fast, global optimization, robustness and versatility of the problem, and soon attract the attention of researchers in related fields. The algorithm has also achieved good results in solving other combinatorial optimization problems. At present, ant colony algorithm has been widely applied to the job shop scheduling problem, but less applied to the supply chain scheduling problem.

Under the environment of complete information sharing, the MC manufacturer is assumed to master the processing cost, processing time and unit inventory cost of all cooperating suppliers, and to implement dynamic optimal scheduling of order tasks from the perspective of the overall optimization of the supply chain. TSP like search method can be used to solve the problem. The following are the specific algorithm steps:

Step 1: Initialize the pheromone concentration of each arc in the graph. The initial pheromone concentration of each arc is the same.

Step 2: Generate a generation of artificial ants at the virtual starting point sPoint and gradually construct a path that traverses all the subtask nodes according to certain rules.

Step 3: At each step of path construction, ant K (current node n) moves to neighborhood node s according to the following rules.

(a) The next feasible node set $F^k(t)$ is generated by calling the JESS expert system and reasoning according to the visited nodes and the corresponding rule base. If $F^k(t)$ is empty, the artificial ants have completed traversing, recording paths, and turning to step 4. Otherwise, continue.

(b) In the feasible node set, mobile selection is carried out according to the following pseudo random proportional state migration rules:

$$s = \begin{cases} \arg\max\left(\tau_{nl}(t)\right), & q < q_0 \\ s', & q \geq q_0 \end{cases} \tag{1}$$

In the formula, $\tau_{nl}(t)$ denotes the pheromone concentration at time t when the current node n points to the neighboring node L arc; q is a random number between 0 and 1; q_0 is a preset number between 0 and 1.

In the process of searching, the artificial ant moves to the neighborhood node with the highest pheromone concentration by probabilistic q_0, that is, chooses the path according to the pheromone guidance completely, this way is called knowledge utilization; correspondingly, the artificial ant carries on the biased exploration by probabilistic $1 - q_0$. At this time, the artificial ants move to the neighborhood node S' with probability $P^k_{ns'(t)}$.

$$P^k_{ns'(t)} = \begin{cases} \frac{\tau_{ns'}(t)}{\sum \tau_{nl}(t)}, & s' \in F^k(t) \\ 0, & s' \notin F^k(t) \end{cases} \tag{2}$$

In the formula, $\tau_{ns'}(t)$ is the pheromone concentration on the arc $arc(n, s')$.

(c) Return to (a) and proceed to the next node selection.

Step 4: when artificial ants finish traversing, calculate the path quality according to the rules.

Step 5: pheromone update and path storage. After each generation of artificial ants has completed the traversal and path evaluation, pheromone concentrations of arcs A in graph G are updated according to the following rules:

$$\tau_{ij}(t+\Delta t) = (1-\rho)\tau_{ij}(t) + \Delta\tau_{ij}(t+\Delta t) \tag{3}$$

In the formula, P is the volatilization rate of pheromones. The first part of the above formula is the residual amount of pheromone volatilized after a traverse of each generation of artificial ants; the second part is the pheromone reward function, given by the following formula:

$$\Delta\tau_{ij}(t+\Delta t) = \begin{cases} \frac{Q}{E_O}, & \text{Path ij belongs to the historical best path O.} \\ 0, & \text{Other} \end{cases} \tag{4}$$

The Q in the formula is the preset parameter, and E_O is the evaluation index of the historical best path O. The best path of each generation is compared and the best value is stored.

Step 6: cycle execution. If it has converged to the optimal value or reached the maximum ant colony algebra, it exits the loop, outputs the optimal path and the start-up time of each sub-task, that is, the final scheduling scheme; otherwise, it runs in Step 2.

The algorithm flow of ant colony algorithm is shown in Fig. 5 below.

4.2 A case study of MC supply chain dynamic scheduling

In order to simplify the calculation process and facilitate the analysis of scheduling results, this section extracts a certain section of customized production and marketing process of X company selects six orders data to verify the analysis. These six orders have the same order decomposition structure (as shown in Table 2). Table 2 shows the processing time and the latest delivery time of order subtasks within the enterprise. Table 3 shows the production cost of each enterprise. The inventory cost per unit time is calculated at 0.5% of the production cost of the product.

The cost weighting factor W1 = 015 is selected, the time weight is w2 = 0.985, and the delivery time penalty factor P = I0. The initial pheromone concentration is 0.2, and the minimum pheromone concentration is 0.05. The pheromone volatilization rate P = 0.15, the optimal path reward factor Q = 25, 75 artificial ants per generation, a total of 600 iterations. Figure 6 shows the change curve of the evaluation indexes of the first 200 generations in a scheduling optimization process. The optimal routing of the scheduling calculation appears in the 529th generation. The evaluation index is 115,182. All orders are completed in 58 unit time. The optimal scheduling scheme is shown in Fig. 6.

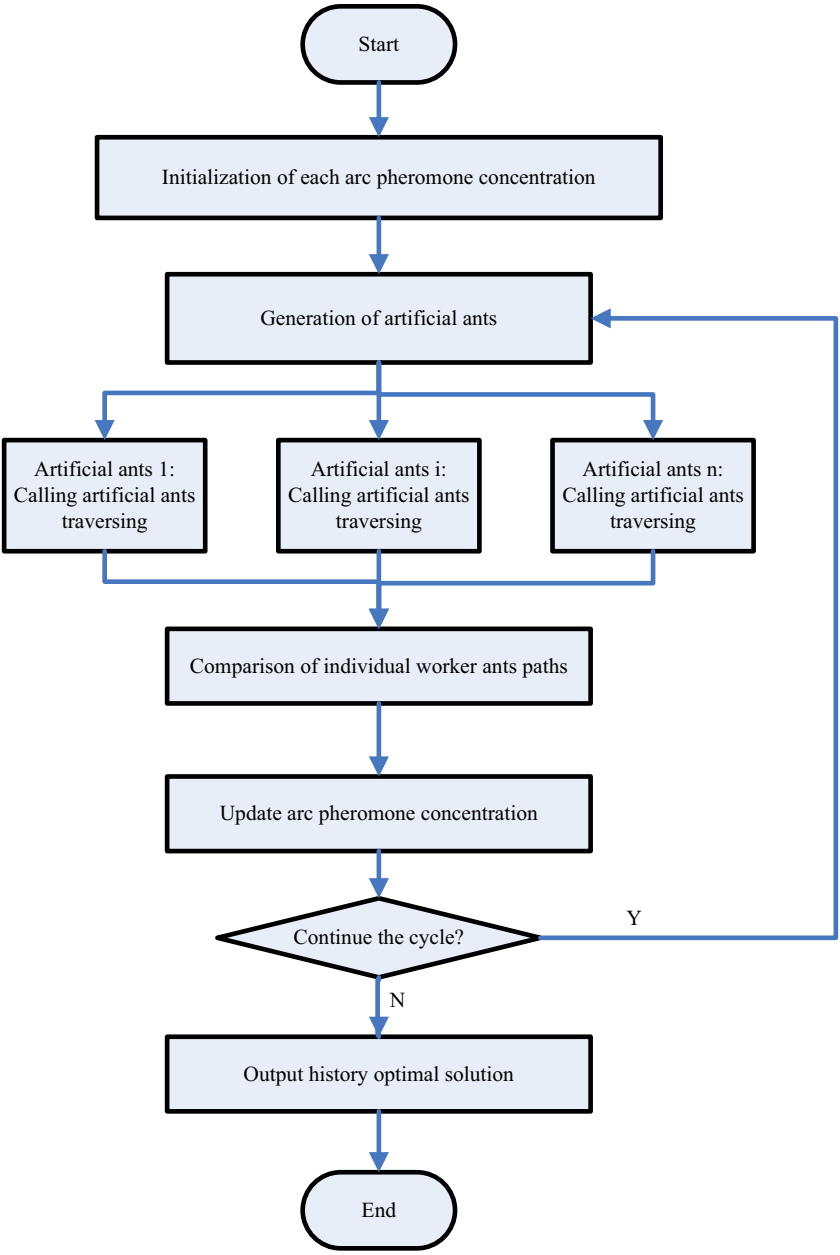

Fig. 5 Ant colony algorithm for MC supply chain scheduling model

In order to test the optimization degree of the scheduling scheme and the adaptability of the algorithm to the order task, multi-group order data are used to carry out scheduling operations respectively, and the scheduling scheme is compared with the

Table 2 Submission processing sched

	P1	P2		P3	P4			P5		P6	Deadline
		S1	S2		S3	S4	S5	S6	S7		
Order 1	4	4	6	2	2	3	4	4	6	3	45
Order 2	7	10	9	3	3	3	5	7	8	5	65
Order 3	7	6	6	3	3	5	5	11	15	5	80
Order 4	10	13	11	4	4	6	6	10	11	7	80
Order 5	10	9	11	4	4	5	9	14	10	7	65
Order 6	19	17	21	7	7	12	9	34	16	13	55

Table 3 Cost list of order processing

	P1	P2		P3	P4			P5		P6
		S1	S2		S3	S4	S5	S6	S7	
Order 1	13,478	1437	1528	2265	853	692	796	2972	3592	3174
Order 2	25,845	2712	3394	4419	1324	1255	1528	7388	5951	6277
Order 3	25,845	2773	3457	4419	1399	1268	1658	6351	5931	6277
Order 4	38,212	3934	4429	6573	1976	1831	22,334	11,126	9267	9350
Order 5	38,212	3978	5175	6573	1932	1886	2449	11,948	8956	9350
Order 6	75,313	7948	6985	13,935	4527	4274	4689	22,921	17,669	19,597

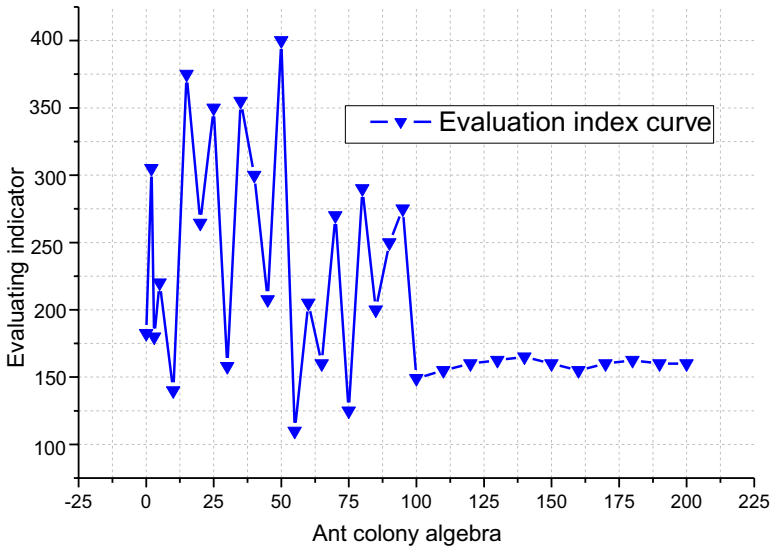

Fig. 6 Optimum path evaluation index curve of ant colony

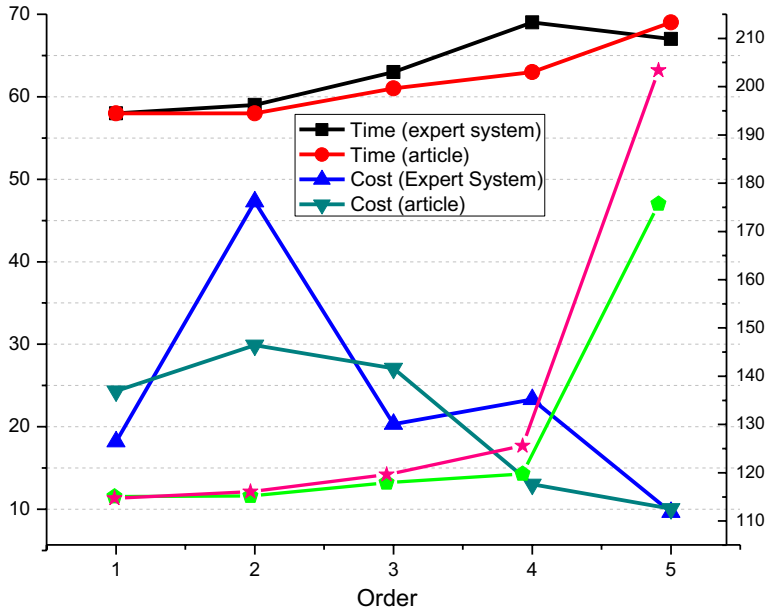

Fig. 7 Comparison of different algorithm scheduling

expert system scheduling scheme. Figure 7 lists the comparison results of the two scheduling schemes under different delivery deadlines. As can be seen from Fig. 7, the expert system has better performance characteristics in the aspect of processing cost optimization, but it is obviously inadequate in the aspect of time characteristic optimization. The two scheduling algorithms have their own advantages and disadvantages in the aspect of inventory optimization. From the overall evaluation, the expert system is superior to this algorithm only in the case of the first delivery deadline system, when all orders can be delivered within 90 units of time, for this example is equivalent to no strict delivery deadline system. At the same time, the completion time of the two algorithms is the same, while the expert system is slightly better in terms of cost. With the strictness of delivery deadline, the gap between expert system and optimal solution is more and more obvious.

5 Conclusion

In this paper, the demand model of MC supply chain is established from multiple perspectives for the mass customization (MC) EC synchronous supply chain management information system (SCMIS). On this basis, an enterprise communication interaction architecture model suitable for MC supply chain is designed. Secondly, the supplier evaluation and selection of MC supply chain are studied, and two-stage decision-making models of general supplier and customized component supplier are proposed. Aiming at the multi-enterprise collaborative dynamic scheduling problem driven by customer orders after MC supply chain CODP, under the assumption of complete

information sharing and incomplete information sharing, the scheduling optimization model, model solving algorithm and application cases are deeply studied in this paper. However, the effectiveness and stability of the models and algorithms proposed in this paper have been verified by application cases or experimental data, but they have not yet been used in the actual MC supply chain, which should be improved in the future.

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