Electronic Commerce Platform of Manufacturing Industry Under Industrial Internet of Things

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Abstract. With the development and evolution of industrial information technology, the market competition intensifies increasingly of traditional manufacturing, the polarization speed up. So enterprises must change from the original traditional way to the Internet and innovate business models. In this article, we first briefly describe the relationship between the industrial Internet of things and electronic commerce (E-Commerce), and the current situation and development trend of E-Commerce in the manufacturing industry. Next the new model of the manufacturing E-Commerce platform is explained. Then we give a new framework of the E-Commerce platform. We hope to inspire more technological development and progress for Manufacturing E-Commerce.

Keywords: Industrial Internet of things · E-Commerce platform · New model · C2M · B2B

1 Introduction

The entire world is in the transition from the old to the new. The traditional business structure is being disintegrated little by little. The first wave of impact strength is the Internet and E-commerce, the second wave is "Industry 4.0". "Industry 4.0" depicts a highly flexible and intelligent manufacturing model with real-time, effective communications between people, equipment and products, and the core is Industrial IoT [1, 2]. What relationship is between "E-Commerce" and "Industrial IoT"? As the current situation shows, E-Commerce solves the better consumption, and Industrial IoT is in order to better production. "Production" and "consumption" are the back and front of the enterprise respectively. That is to say, both transform the enterprise from the back and front. But must emphasize this point: in the future production and consumption is unified, the starting point is different, but the destination is the same. To reshape the core competitiveness, manufacturing enterprises need to combine the Internet marketing and Internet IoT together, to pull production and supply based on customization, and to connect the materials, smart factories, logistics and customers into a whole.

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2 Current Situation and Developing Trend of Manufacturing E-Commerce

In recent years, there has been a lot of manufacturing e-commerce platform. There are three main models: the first E-Commerce platform is constructed by the third party service provider, the second is the purchase platform of the industry vertical portal, and the third is the online mall of the manufacturers [3, 9]. Although the existing business platform achieve online shopping, but does not really promote large-scale development of industry e-commerce. Within the next few years, a large number of self-operated intelligent production and service system will appear, and to promote the transformation and upgrading of manufacturing industry towards intelligentization, servitization, datamation and networking. At the same time, Industrial IoT will also reshape the existing industrial value chain system, "No channel" will be the trend of industrial products sales, which will bring enormous impact to the traditional product vendors, but also give the manufacturing e-commerce a huge business opportunities.

3 Key Points of the New Model for Manufacturing E-Commerce Platform

In view of the current situation and existing problems of manufacturing E-Commerce, and the analysis of the demand for enterprise procurement, combining the present industrial development background, there are six main points to be explored.

(1) Supply chain collaboration: due to the industry products complexity, large price fluctuations, delivery instability and the need to eliminate the influence of the traditional marketing channel mode, so it is essential to the success of the platform to integrate the resources of the upper end of the industry chain and achieve business collaboration. Industry associations or third party service provider or large-scale manufacturing enterprises lead several manufacturers corporately develop the new business service model, in order to eliminate the crisis of confidence of the end users, and ensure the accuracy of the information, and supply quality, delivery timeliness and price stability. Moreover, to achieve rapid business collaboration among the suppliers, manufacturers, platform and customers, to help enterprises quickly realize the full range of management and monitoring for business flow, information flow, capital flow and logistics by the platform [4]. At the same time, the platform support information dissemination, supplier record, bid quotes, online assessment, order generation, quality inspection, and contract payment processes etc., to achieve an open, fair and reasonable procurement. The basic structure of supply chain is shown in Fig. 1.

(2) Full life cycle management: With the rapid development of Internet, information technology gradually affects all aspects of manufacturing and product life cycle. Product life cycle management refers to the information and process management of product from the requirement, planning, design, production, distribution, use, operation, maintenance, until the recycling and disposal of the entire life cycle. It is a technology, but also a manufacturing concept [5]. Traditional E-Commerce platform can only provide shopping guide, order, payment and logistics service, due to the manufacturing industry

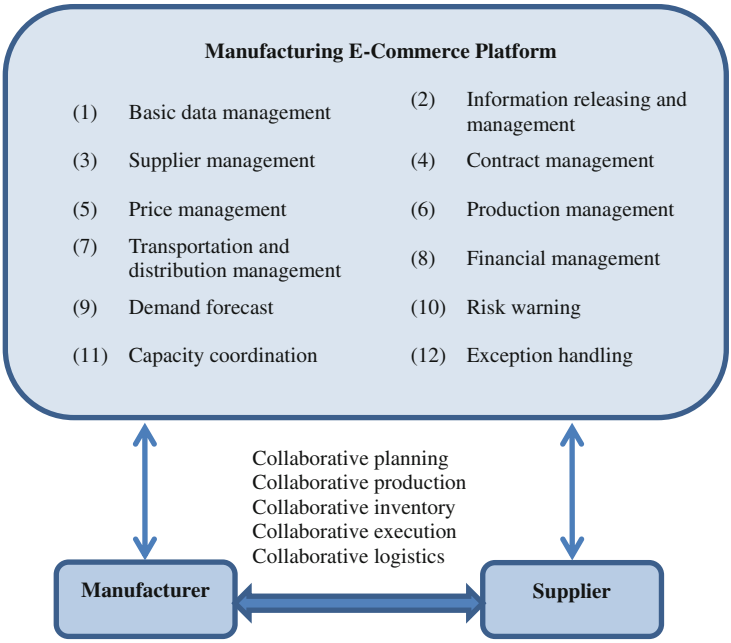

Fig. 1. A basic structure of supply clain

product technical complexity and the application relevance, the current service mode can't meet the demand of users, and the new manufacturing E-Commerce platform must be able to provide the full life cycle management and service and provide online and offline support with taking the customer demand as the center, which requires the platform to gather more manufacturing resource to participate in the formation of the collaboration chain covering the full life cycle, to fully mobilize the enthusiasm and creativity of all kinds of subjects, and to meet the diverse needs of users with rapid response.

(3) Sub themes scene service: Because enterprise objects are numerous, enterprise procurement requirements are different and technical services are with different emphasis, it is necessary to set up special area, to provide the corresponding service, and to carry out personalized marketing and promotion according to the needs of different enterprise groups. At the same time, the platform should take industry applications as the center, to establish the full range service of scene navigation and the virtual application experience [6]. Scene navigation may include equipment for technological transformation, new construction, debugging technology, spare parts procurement. Different scenarios are composed by different solutions including program description, system architecture, technical characteristics and device list etc., and partial solutions provide users with the best shopping experience by virtual scene. Users can clearly see the composition of the solution, dynamic effect, and the hardware and software configuration list, but also can quickly inquire about product details, recent sales and alternative products to quickly enter the purchase link.

(4) Professional system support: With the coming of the industrial 4.0, intelligent manufacturing and service system will be produced in great quantities, the future manufacturing E-Commerce platform need to dock with the professional system, such as equipment monitoring system, maintenance system, mobile inspection system etc. Oriented application system of smart factory (such as APP) will monitor the real-time operation of equipment and the fault diagnosis, generating device replacement, installation, debugging and other technical requirements, so that the E-Commerce platform quickly make anticipation judgment and initiative service [7].

(5) Combined with Internet financial: According to the current problems for enterprise users such as a large amount of procurement, complex process links, slow payment, etc. In order not to affect the capital chain operations, we can use the new financial model with Internet based on the purchaser, the supplier and the platform protocol, to flexibly adopt the current Internet financial means, including crowd funding project, order financing, credit payment, secured transaction etc. The platform can also integrate the fourth party arbitration, insurance, bank and other resources to do a good job in risk control.

(6) Personalized customization: Starting from the overall benefit of the supply chain, based on the customer's perspective, the platform meet personalized customer demand and achieve a single product of mass customization and product family for mass customization. On the platform, customers can communicate with the manufacturer directly and propose customization demand. Manufacturers can achieve zero cost financing, zero cost promotion and zero inventory and easily obtain mass production orders by the presale mode of the platform, then trigger the procurement, design, production and delivery of a series of processes. At the same time, it can become a reality to structure the transregional dynamic enterprises union, not only can help the enterprises to share design and manufacturing resource and optimize configuration, but also help to improve the rapid reaction and competitive ability. Moreover, the enterprises will be able to cooperate with the leading enterprises and produce fully their own advantages [8].

4 Architecture Design of Manufacturing E-Commerce Platform

Driven by industrial development, based on the current manufacturing industry development model, we explore the design of service-oriented architecture for manufacturing E-commerce platform. The architecture (in Fig. 2) may be composed of five parts, include user access layer, information portal layer, application service layer, management layer, technical support layer.

(1) User access layer: In support of multi-mode access, provide personalized mobile application system (APP) for the users, and accelerate the integration of mobile Internet technology. Establish the service space for the enterprises, which not only include the common functions such as product catalog, product selection, order processing, secure payment, logistics inquiries, delivery querying and after-sales service, but also include

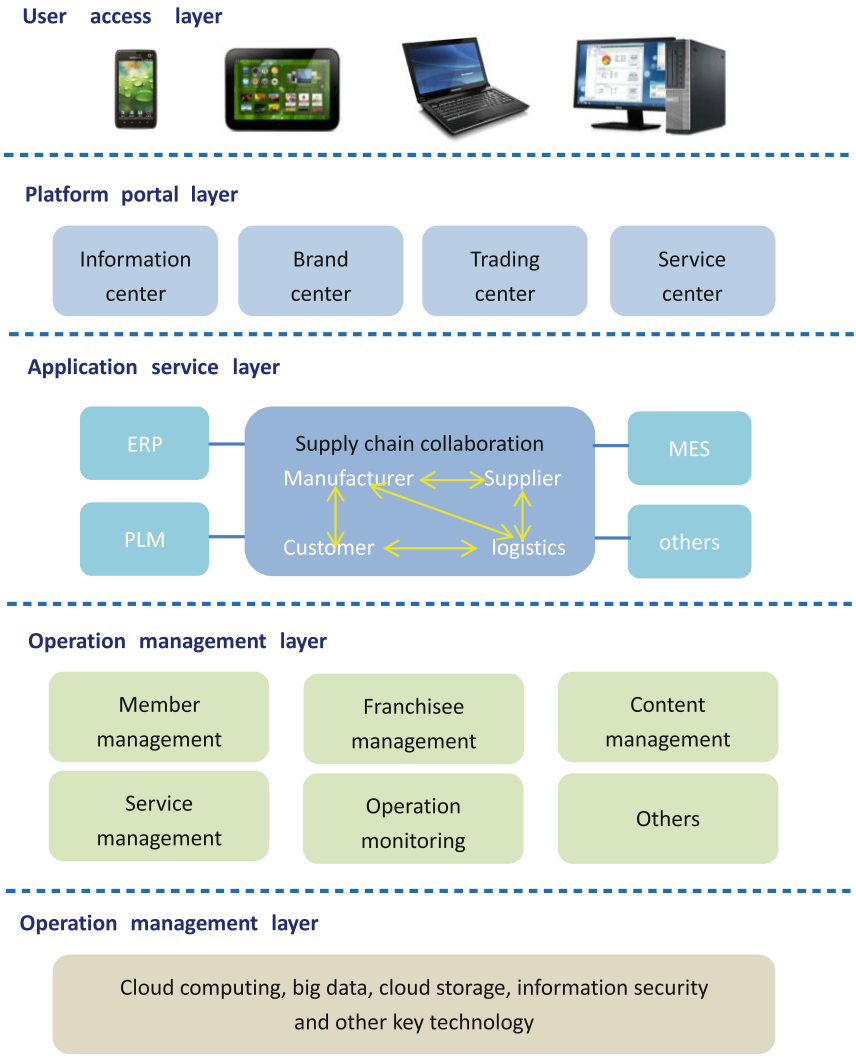

Fig. 2. A architecture of manufacturing E-commerce platform

the value-added services, for examples, equipment inspection, social network, information dissemination, bidding and purchasing, group purchasing. The use can personalize information and functions, and integrate professional manufacturing service system.

(2) Platform portal layer: The platform portals should strengthen fundamentally scene navigation and application experience, break the traditional E-Commerce model and establish information center, brand center, trading center and service center. We should focus on the unique characteristics of the industry to create a professional services center, establish the solutions thematic area according to the direction of technology and

industry application and strengthen virtual scene navigation and experience services. Moreover, establish virtual factory showcase, while providing online service tools, such as 3D browsing, online selection contrast, association query, authentic identification etc.

(3) Application service layer: Mainly for member enterprises and franchisee provides application service system. The enterprises members provide personalized service space and the application store for the procurement user groups. Service space include shopping cart, order, payment, logistics, after-sales and product catalogues and so on, also can download the application systems. The franchisee includes two main suppliers and service providers, and the system mainly provides shop management, product management, order management, information dissemination, account management and other functions.

(4) Operation management layer: Provide the background operation management system, including member management, franchisee management, content management, service management, operation monitoring and other daily functions. It is essential to provide accurate marketing and active sensing service with the information integration of workshop service system.

(5) Technical support layer: The E-Commerce platform is based on cloud computing, big data, cloud storage, information security and other key technology, and constantly develop on-demand applications. So software services will participate in the entire process of e-commerce operation while greatly improves the user viscosity of the web site.

5 Challenges

(1) Industrial networking covers many aspects of communications operators, Internet companies, manufacturing enterprises. Because it is difficult to form a unified understanding about information interoperability and access technology standards, all parties lack the full integration of standards, business processes, management models, knowledge and experience. So "islands of information" will come into being, resulting in information resources can't be shared.

(2) Although the services provide Information products development and sales, but most lack the overall solution of industry segmentation, do not attach importance to manufacturing enterprises to provide overall design, customer development, configuration and operation of software and maintenance management service as a whole, and are located in the design, manufacture and management process. The advanced services of manufacturing value chain are obviously insufficient.

(3) Supply chain collaboration is not only a point to point information exchange and sharing. To achieve information sharing among all members of the supply chain, in response to customer demand, the flexible and collaborative supply chain is a must. The information platform based on the Internet of things can collect and perceive all kinds of information, analyze and process the information, and form a variety of collaborative decision-making.

(4) At present, in the global range data and user information leakage of network security issues have become increasingly prominent, but also a threat to the

manufacturing industry of information security. With the manufacturing industry increasingly using mobile devices and mobile APP, although the efficiency of collaborative work has been improved, but the data security of public WIFI and mobile networks will become particularly prominent, lost mobile device will not only lead to private disclosure of information, so that more enterprises have data leakage risks.

6 Conclusions

In this paper, combined with the development trend of "Industry 4.0", explore a kind of service mode, which is based on supply chain collaboration, full life cycle management, personalized customization and other key points, in order to solve the current industry development bottleneck. At the same time, gives the reference model of the E-Commerce platform, and comprehensively enhance the business collaboration between users, platforms and manufacturers, hoping to promote the specialization and scale development of the E-Commerce platform.

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