A Cloud Model of Smart Phone Industry

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***Abstract*—in this paper, we expounds a cloud model of smartphone industry, and achieved consumers actively participate in the customization services of smartphone. Through social production theory and the combination of cloud computing services, use many kinds of 3D technology, new process technology of cooperative management, e-commerce, logistics and wisdom dynamic value chain analysis and so on. Using many kinds of technologies, we constructed a new model to customize smartphone at the cost of mass production. This mode make all participate in the design, all take part in manufacturing, and everyone enjoy the products. This new service mode will effectively drive the transformation and upgrading of industries, satisfied the growing need of customers' personalization, reduce the uncertainty of each tache of the supply chain, and will bring new economic growth.**

Keywords—cloud service model; smartphone industry; value chain

I. INTRODUCTION

With the rapid development of information construction and improvement of people's living standard in China, Smartphone has become the essential electronic terminal to the people's work and life. However, the industry model developed by the function machine has been unable to meet the people's increasing personalized needs, what directly causes the decrease of consumer satisfaction with the smartphone products, then life cycle and the time of market sales is shortened. The sales increased uncertainty, supply chain inventory risk increase of each node, a substantial increase in electronic waste, waste valuable resources and cause serious pollution of the environment. The smartphone industry to cloud computing is put forward in order to solve this problem with cloud model, 3D printing, 3D display technology as the support, meeting the pursuit of personalized mobile phone, reducing the supply chain uncertainty, being reasonable and effective use of social resources.

II. DEVELOPMENT OF SMARTPHONES

A. Demand for Smartphones

With the rapid development of China's information construction, information consumption is booming, the people demand for smartphone equipment increasingly strong, become a hot market. Domestic brand mobile phone enterprises hard skills, unceasingly strengthens independent innovation ability, actively introduces smartphone products in line with the national conditions and meet the market demand. Telecom operators by means of mass customization and group purchasing, charges subsidies, contract purchase and other means to expand the market, effectively promoted the popularization of smart mobile phone. At the same time, mobile applications and services with the instant messaging, audio, electronic commerce, mobile Internet, mobile payment as the representative is rapidly rising, driving the growth of smart mobile phone market.

The year 2013, China's mobile phone production reached 1.5 billon units, up 23.2%, an increase of 18.9 percentage over the previous year growth rate. According to shipments measure the IDC released in 2013 global mobile phone 1800000000, China accounted for global shipments share reached 81.1%, increased by more than 10 percentage points more than in 2012, the global mobile phone manufacturing base in China's position has been further. According to China Electronic Information Industry Development Research Institute is expected, 2013 to 2015 is the smart mobile phone of our generation peak. Three years accumulative total sales will reach 2 trillion yuan, sales of Chinese smart mobile phone market will continue to maintain high growth.

B. Supply Chain Models

Smart mobile phone development comes from the traditional mobile phone industry, composed of upstream suppliers, manufacturers, mobile phone operating system providers, application developers, distributors, operators, users and other links. The upstream suppliers in design and production of chips, touch screen, camera and other spare parts to supply mobile phone manufacturers, manufacturers through

large quantities of ODM, OEM mode of production, assembly, loading the operating system and software, products through distributors and telecom operators and other channels into the market for the user to choose.

Smart mobile phone industry development mode from the traditional functional mobile phone, through the ODM, OEM open loop mode mass production can effectively reduce the production cost, but the compromise design and lack of personality, has been more and more difficult to meet the demand for personalized mobile phone. This directly reflected in the upgrading of frequent mobile phone, mobile phone life cycle is shortened, the inventory of waste and electronic waste is increasing.

Figure 1. Smartphone Supply Chain Model

III. Cloud Model of Smart Mobile Phones

Smart mobile phone industry refers to the application of the Internet cloud model, cloud computing services platform, 3D printing, 3D display, supply chain management, technology, integrate the industry resources, industrial economic development mode to form customization, achieved by the consumer demand for personalized driving mode of social services, for consumers to participate in all aspects of product design, manufacturing in the whole life cycle, then produces satisfied products for consumers. Set in the industrial chain of suppliers, manufacturers, designers, consumers in a closed-loop cloud services platform, an accurate grasp of consumer demand, make full use of resources, reduce the inventory, and reduce the pollution of the environment of electronic waste.

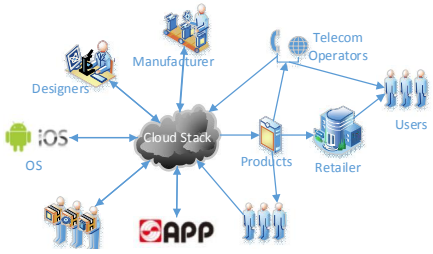

Figure 2. Cloud Model of Smartphone Industry

A. Consumer Demand and Ideas

The manufacturer and the design team to design a product, advertising LED push mode has been unable to meet the personalized needs of the vast number of consumers. In the smart mobile phone cloud model, consumer proposed the demand and is the beginning of the end demand. Consumers login in cloud services platform what shows their needs and ideas. Consumers sign cloud services platform, can release the demand by fuzzy language description in demand and creative platform, or through the 3DMax and other intuitive graphics to show the demand and creative.

B. Design

Provide demand or creative in the consumer, the workflow engine and collaborative business environment will need to provide some personal designers or design team, shape, electronic circuit, chip and mobile phone according to the demand of consumers for the design, completion of the design through the 3Ddisplay, electronic circuit simulation technology, the design of feedback to demand, to see whether meet the demand, if demand is a deviation, further proposes the demand, design the next version.

C. Manufacturing Cloud Service

At the completion of design scheme, the work to keep the engine filter is suitable for production of enterprises, consumers choose manufacturers on cloud services platform, the production orders. Received so many orders to manufacturers, through the process of parallel collaborative management technology, multiple mobile phones will be customized by the same manufacturing platform, continuous operation, the effect of scale, in order to reduce the production cost. Through the manufacturing platform orders demand, driving the upstream suppliers order spare parts production enterprises.

D. Smart Logistics Cloud

Customized mobile phone in the production process of every parts has a unique barcode, every aspect of strict control of material flow of the whole process, the final products to enter the logistics in manufacturing good later. Intelligent logistics cloud platform will produce mobile phone packaging, and through the platform of logistics service enterprises timely smart mobile phone to customize the hands. Smart logistics cloud connect the physical distribution process, through the collaborative technology to realize the whole industry chain Just In Time production, to achieve zero inventory, reduce inventory costs, risk reduction of various segments of the industry chain.

E. E-commerce Cloud

Electronic commerce throughout the cloud service platform, is an important part of the platform. Electronic commerce function at three aspects: information service, transaction and payment. The main content of the electronic commerce includes: electronic business advertising; electronic and trading of choose and buy, the exchange of electronic trading certificate, online electronic payment and settlement and after-sale service, etc. The main trade type enterprise and individual trading (business-to-consumer), a transaction between companies

(BtoB) personal and consumers to consumers' three modes. Participate in e-commerce entities: demanders, designers, manufacturers, the upstream suppliers, other distributors, banks and certification center. Information services, e-commerce cloud will provide design and creative platform. On this platform all per design and creativity can be displayed on the platform. Creativity and design on this platform is goods, and consumers can choose their satisfaction on creativity and design platform of design and creativity. Then they use the design order to create customized smartphone. E-commerce platform can make efficiently use of funds, all the money in this industry are concentrated, reasonable use of the capital time efficiency. It accelerate the circulation of funds, reduce the utilization of funds, and reduce the risk of each of the participants in the capital.

IV. CONSTRUCTION OF THE CLOUD SERVICE PLATFORM

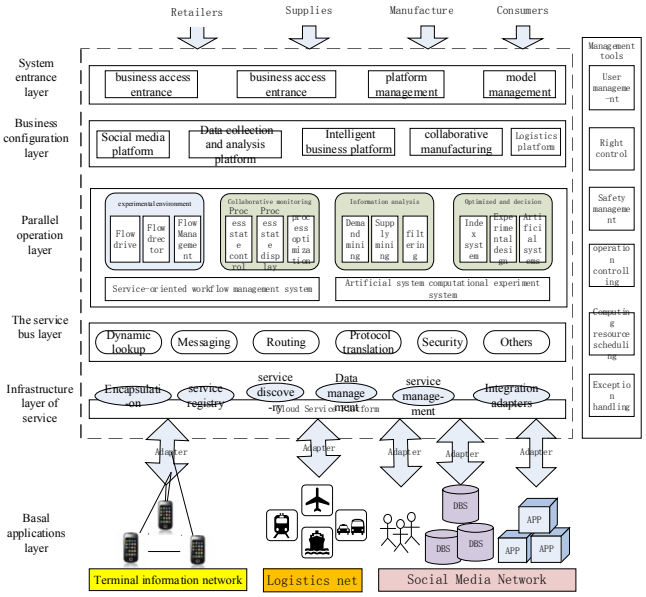

Figure 3. System Architecture of the Cloud Service Platform

A. Basal applications layer:

It include terminal information network, modern intelligent logistics network, heterogeneous operating systems, social media network, and TCP/IP network. Provide terminal interaction ability, modern logistics network provides logistics capability, TCP/IP network shielding physical connection features and providing transparent information and communication services, make all kinds of distributed heterogeneous information systems and database can be carried out in accordance with the specification SOA integration packaging, and operating through the way of service. The hierarchy in the manufacture of social play the important role of information interaction terminal, ship products.

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D. Infrastructure layer of service

Infrastructure layer of service include service encapsulation, service registry, service discovery, service data management, service management and integration adapters.

Service encapsulation module will integrated package existing application system function, data, and personnel, and transform into the service can be accessed through a standard way.

Service registry module use standard UDDI protocol, to classify and release the existing service. Service providers can release services, and through which users can search for available services. In the service registry, service is divided into three types: business services or business processes, business functions services, and technical services.

Service discovery module is based on the classification information of services registration module, the function of the service description, etc. Its function is provide related service for a specific user needs or requirements from the service bus.

Service data management module provides the management and access of heterogeneous data to the system's SOA framework, including mapping and access to all kinds of Relational Database, and access to all kinds of business objects and actions.

Management module includes services version management, and the whole life cycle management, etc.

Integration adaptors management, will unified management various kinds of adapters and interfaces .By integrating the existing application and information, it will provide more and more value-added services on the existing system.

E. The service bus layer:

The service bus layer include dynamic lookup services, messaging services, routing, transformation services, protocol translation services, security services, as well as other standard services.

According to the request of the service requesters, with the aid of a service registry, service discovery and the corresponding knowledge, dynamic lookup services, messaging services, routing transformation and protocol conversion services eliminate the technical differences between different application, make the different applications operating coordinate, realize the communication and integration between them. They can help reach the goal of company internal information accurate, efficient and safe transmission.

Security services, and other standard service make sure the service requests and service providers communicate in loose coupling and dynamic way, and ensure interaction is safe and efficient. That's very important, we must provide reliable services to the customers.

F. Parallel operation layer

Six parts compose the parallel operation layer, including experimental environment, artificial system calculation experiment system, collaborative work environment, collaborative management, and information analysis and optimization decision-making environment.

G.Business configuration layer

Business configuration layer include smartphone entity shop workbench, smartphone network shop workbench information extraction, social media platform, data collection and analysis platform, intelligent business platform, management platform of collaborative manufacturing, logistics management platform.

H.System entrance layer

System entrance layer make up of business access entrance, configuration of business entrance, platform management and model management. It makes a variety of different customers can access the system in the form of different access, and can set up and deploy the corresponding system. This layer can be build based on the Portal technology, from the perspective of functions, including content aggregation, based on the view for the role of customization, personalization, collaboration capabilities, internationalization and support different the client Web browser, PDA, etc..

V. BIG DATA AND THE VALUE CHAIN

With the emergence of big data and widely adopted, big data for many people is undeniably means many aspects, no longer limited to the technical field. Now, big data has become a priority task on business, because it is able to have significant influence on global integration of economy business. Companies around the world are looking for new ways to compete and win. They constantly transformation, in order to make full use of large amounts of information to improve decision-making and performance across the enterprise. And from the perspective of value chain, the advent of the era of big data, make the enterprise have the chance to by analyzing big data convert the links of value chain more strategic advantage for the enterprise.

The smartphone industry cloud service platform can easily gather all data of industry chain from requirements, to the production process, to all aspects of the various nodes. Through analyzing these data we can accurately grasp the needs of the consumers and fashion trend. We can of effective forecast sales market trends, and adjust industry development plan in time, that bring great value to the whole industry chain. Big data also for the process, organization, the whole industry, even the transformation of society itself has inspired many new ways, make the enterprise have the chance to by analyzing large data convert the links of value chain more strategic advantage for the enterprise.

VI. CONCLUSION

The cloud model of the smartphone industry described in this paper can rational use the industrial chain resources and achieve custom-make smartphone at a cost of volume production. On this platform we can design and use the smartphone we wanna. Everyone take part in the design, and every one enjoy the products. This also means considerably less electronic waste because people will no longer have to throw away chargers when they design new phones. For the manufacturers and supplier, they don't need keep a large inventory, save much capital, and keep the risk at a low level.

VII. ACKNOWLEDGE

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REFERENCE

[1] F.T.S. Chan; H.K. Chan; K.L. Choy;. A systematic approach to manufacturing packaging logistics [J]. The International Journal of Advanced Manufacturing Technology,2006.9-10

[2] Ghiassi M, Spera C. Defining the Interne-t based supply chain systemfor mass customized markets [J]. Computers& Industrial Engineering,2003, 45:17-41

[3] Kazuyoshi Hidaka; Service Scienceservice science, Management, and Engineering SSME (SSME) in Japan [J]. Handbook of Service Science, 2010.

[4] G. Da Silveira, D. Borenstein, and F. Fogliatto, “Mass customization: Literature review and research directions,” Int. J. Prod. Econ., vol. 72, no. 1, pp. 1–13, 2001.

[5] S. W. Anderson, “Measuring the impact of product mix heterogeneity on manufacturing overhead cost,” Accounting Rev., Jul. 1995.

[6] Saaty T L.Fundamentals of Decision Making and Priority-Theory with the Analytic Hierarchy Process.2000

[7] Tetsuro Morimura;Eiji Uchibe;Junichiro Yoshimoto;Kenji Doya; A New Natural Policy Gradient by Stationary Distribution Metric [J]. Machine Learning and Knowledge Discovery in Databases, 2008

[8] Amy H. I Lee, Wen-Chin,Ching-Jan Chang.A fuzzy AHP and BSC approach for evaluating performance. Expert Systems With Applications. 2008

[9] Hyun Joon Shin. Collaborative production planning in a supply-chain network with partial information sharing [A]. The International Journal of Advanced Manufacturing Technology[C],2007.9-10