

Technology trend analysis for business model innovation of printing industry: Case study of "Composed printing service model" in Taiwan

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Abstract

Innovation is the most important power to keep competitive advantages in 21 century. Include technology innovation, product innovation, manufacturing process innovation, business model innovation, service innovation, and organization innovation are some major types of innovation.

Printing industry is called as "Producer Service Industry" to offer printing services for publishing, packaging, and advertising industries. Conventionally printing service model is based on "single printing job for single client" and treat every client order in independent procedure. Since e-business has been influence every industry in late 20 century, no matter service business or manufacturing business are changing business model to look forward to new competitive advantages.

In past 10 years there were some printing companies in Taiwan start to offer a new business model called "composed printing service model" in e-business environment and has developed a success service process for POD (print on demand) services in conventional ink printing devices.

The major goals of this paper are focus on this new business model and discuss process innovation that follow and support this new business, also discuss printing technologies development trend that need in e-business world.

Introduction

The printing industry is a technology-driven industry. Deal with, include prepress, press and post-press process, all need Hi-Tech printing devices and the master workers with professional abilities to finish the jobs that the clients appoints. So the printing industry is a kind of technology leads and manufacturing-oriented industry that must keep follow technology trends. There two major reasons that explain why technology forecasting is extremely important for every industry:

1. In order to maintain the competitive advantages, it becomes the important way to plan the competitive strategies that the printing enterprise holds the scientific and technological development trend.
2. It is the important guide that the equipment supplier carried on R&D.

But frequent day by day with the economic activities, strong market competition, and the customer's demands are diversified day by day, the printing industry operates for clients more service-Oriented direction develop. How printing enterprise to offer services? It is according to the client's order, in prepress, press and

post-press professional abilities to finishing printing job deal with specific requirement that offer by individual client. So can figure out the core value of printing industry is "printing services" and define it as the "Producer Service Industry". Act as the value of the printing industry has already transform from "manufacturing-oriented" to becoming "service-oriented", technology forecasting direction of printing industry will also change to the technology based on service demand.

In conventional thinking, technology development analysis and forecasting is start from technology site and kept on engineering way, also done in quantitative approach mostly. This paper will discuss printing technology development trend in marketing demand site and based on producer service strategy. The innovation of service that discussed in this paper is focus on process innovation and service model innovation, and illustrates offset printing industry of Taiwan as a case. The category that this paper discusses concentrates on the conventional ink printing without digital printing.

What is Innovation? Why need innovation and How?

Definition of innovation

Idea that "innovation" is most by economic scholar's Joseph Schumpeter[1] early Propose, a pioneer when we talk about innovation management. Around the 1930s Schumpeter started studying how the capitalist system was affected by market innovations in his famous book "Capitalism, Socialism and Democracy". He described a process where "the opening up of new markets, foreign or domestic, and the organizational development illustrate the same process of industrial mutation, that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one". He called this process "creative destruction". He developed a theory where a company's ability to innovate was mainly connected to its size. Initially he defended that small companies should be in a better position due to their flexibility while large companies might get trapped in bureaucratic structures.

One important insight arising from Schumpeter ideas, though, is that innovation can be seen as "creative destruction" waves that restructure the whole market in favor of those who grasp discontinuities faster.

According to Schumpeter and a lot of research, "innovation" was a kind of value creation activities that could make enterprises adds new value again. Enterprises generally adopt continuous

improvement of the conduct at present, the broad sense speech one is a kind of progressive innovation, enterprise keep improve on products, process and efficiency to improve customer service and create new value for customer, and then promote one's own competitive advantages. All can propose the new idea, new method, or new products, new services; all belong to the category of innovation.

Innovation is the course of establishing the new things. The fundamental of innovation is essential and not only the breakthrough in technology or the knowledge, also includes organization innovate new structure and new operation and new approach in marketing, must create the apparent benefit for customer, otherwise can't be considered as profitable innovation. Innovation is the most valuable activities of every enterprise in the 21st century.

Follow discussion before can conclude the definition of "innovation: "Innovation is the approach and process to create new concept through new technologies, new manufacturing process and new products, and make new method of service to serve the markets newly and create new values for enterprise it self and market". General understanding the innovation is start from technology innovation because new technology developments create new economic generation. The classification of innovation can generally be divided into the following types [2] :

1. Products innovation: Introduce new product to the market in new function, produce the function substitution to the old products.
2. Process innovation: Create new manufacturing and service process to substitute old process, in order to improve production efficiency, promote the quality of the products, and can reduce the manufacturing cost by a wide margin.
3. Service innovation: Based on new technology, develop the new service process or create new service model, offer better service mechanism and efficiency to the market.

On the other way, according to the innovative degree and impact on industry, innovation also can be divided into two major categories [2]:

1. Radical innovation: New technologies are discontinuous to old technology of development route; produce the progress of the jumping type. This can offer a chance to create new market, break market rules and create brand new product and market philosophy. For example TFT LCD substitute old CRT Monitor technology, whole displayer industry changed, the impact of TFT LCD technology also influence TV industry and make TV broadcasting in HD resolution can come true. Compare to conventional prepress method, computer to plate is a radical innovation also.
2. Incremental innovation: New technologies are extended the journey of old technology development, progressive improvement emerges to the original industry. These innovations follow market rules and can be predict what will happen. For example the technologies that control the sheetfed offset printing machine to increase printing speed from 8000 RPH to 18000 RPH are typical incremental innovation.

The major motive force that strengthening innovation are two directions: Technological progress power and market demand power. The technological progress power for enterprise is produce the strength of "Technology Push" impact. New technologies create new product and new method that can generate new

technological generation. No matter printing industry or the other industries need to look forward to new patent authorization, invest new printing machine, plan new training courses, all of these efforts are following new technology and no company can avoid impact. Enterprise must to grasp new trend in order to strengthen the production technology and to keep competitive advantages. Another side turns towards and develops for innovation is market demand power. Because the customer's demand develops fast, printing enterprises and printing equipment suppliers must offer new equipment and new technologies in order to meet the brand-new demand of the market. It means the market demand change is the drawing out power to "pull" technology progress and innovate continuously forward.

No matter from "Technology Push" or from "Market Pull" power, innovation is the most important action for every enterprise to grow up continuously and to keep competitive advantages. What is the leading power on "Technology Push" or "Market Pull"? The answer is "the mutual influence of two kinds of strength". Technology Push and Market Pull mutual power influence the market form the "invisible hands" that Adam Smith talks about [3] [4] and become the major impact power to force market competition.

Printing industry is a "Producer Service Industry"

What is the real situation of printing industry in 21century? High invest cost, urgent well-trained engineering requirement and professional abilities construct the printing industry as the "manufacturing oriented" industry. But if think what printing industry is from different philosophy? Printing company offer "printing service" for individual client in professional equipment and skilled engineer, so printing also has the characteristic as the "service industry".

What is the core value of printing industry? The core value of printing industry lies in offering the "duplication service" for client. Client design content pages, printing company print those contents must follow specification and requirement in correct color and correct size. Designer chooses paper and decide layout, printer do "printing and finishing" job. Such characteristic of printing industry accords with the characteristic of "Producer Service Industry".

What is Producer Service Industry? "It is not used to consume directly, not produce utility directly, it is a kind of middle input, used for producing other products or the service" [5]. On the other word the target customer of the producer service industry is focus on producer not for end user. Printing company print and duplicate for the publisher, advertising agency, manufacturing company...etc., those companies use these printed paper becomes a part of final product goods. For example computer manufacturers put the user manual print order to print shop, user manual is a part of whole PC computer package. The customer evaluates printing company in service quality index i.e. equipment, quality stability, service efficiency, cost efficiency, service satisfaction, engineer skill level...etc. The service image of printing company decides its competitive advantage.

According to the basic definition of marketing, no matter Philips Kotler [6] or other famous scholars, enterprises must meet demands of customer and just possess the advantage of the competition. The printing enterprise offers the professional service

of printing, must meet the customer requirement and quality expectation, from the view point of marketing printing industry is a the typical service industry.

Printing Service Process: Conventional and Composed Model

There are many different customer type, printing service must meet different requirement, a typical work is printing company use individual production process to keep every individual order was been treat correctly. Figure 1 show this conventional service model.

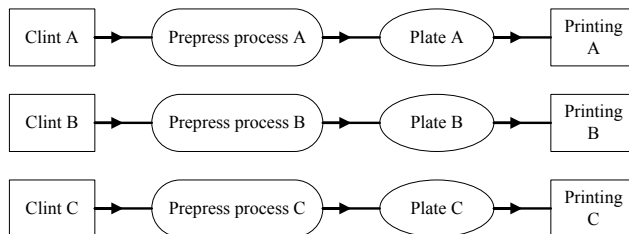


Figure 1. IS&T logo (note the use of bold and italics)

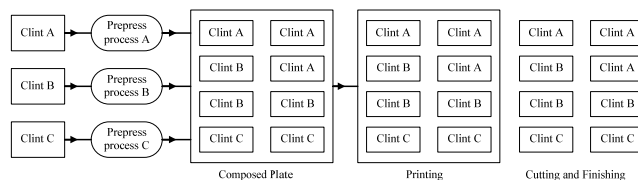
The conventional service model remains the main service model until today and can offer perfect printing service on long run length printing order. But in the face of market change fast and trend is “multi items, short printing run length”, it is difficult to drop and unable to go on in conventional service model. Fortunately the brand new concept “Print on Demand” and new digital printing technology just fit this new market trend.

Digital Print on Demand service, the solution that is really very good for offering printing service on small quantity order, but there are three major problems needs to overcome for small size printing shop:

1. Investment cost, maintain cost and running cost is high.
2. It needs to educate the customer to accept the digital printing quality compare to ink printing.
3. Digital printing highly need IT capability. Human resources development and training is totally different from conventional printing knowledge training courses. It is a challenge for printing shop.

There are a lot of printing company in Taiwan still in small company scope, already have possessed good printing quality and service ability in offset ink printing through the market competition for many years. For keeping to efficiency continuously, and can offer quickly service response to short run order, some small printing shop start the “Composed Printing Service Model” in conventional offset ink printing for POD service since late 20th century. The model diagram shows on figure 2.

Figure 2: Composed Printing Service Model



What is the core value of the composed printing service model? This model is the print on demand service in ink printing without any printing equipment change. What benefits customer can obtain when the printing company adopts this new model?

1. Can reduce the plate making cost and printing cost.
2. Leading time from order to delivery can be shortened by a wide margin.
3. Can keep visual effect for clients in conventional ink and end user need not to change reading experience.
4. The customer can use pre-designed template offered by printing shop that can reduce design cost by a wide margin.
5. Can serve short run printing order (<500 copies) and high flexibility that fit POD's demand.
6. For “multi items, short printing run length” market trend, this new model have quick response capability.

Compare to conventional model the new composed model is a brand new concept that based on a key success factor “printing process innovation”. By the process innovation, customer obtains benefits mentioned above and capable to develop the market district that the printing cost of conventional process model is unable to serve.

According to the operation experience on composed model that gained in Taiwan, there are some requirement/limitation needs to think about to make service succeed:

1. Reliable and stable broadband internet infrastructure.
2. Print companies have qualified internet/extranet management capability and database security management capability.
3. Internet order management and e-business security management is qualified and stable.
4. Cash flow, information flow and logistic between clients, printing company and paying bank (account management bank) is reliable and securable.
5. Pre-designed templates that offer to clients should as many as enough and update frequently.
6. The printing size is shrinking to standardized size, such as standard A4, standard name card size...etc.
7. The color structure should keep on standard CMYK.
8. Seldom conversion requirement or only standard conversion is need.
9. The paper concentrates on several standard papers type in stock.
10. Customer can accept the new service model.

Discussion and Conclusion

When face to new market of print on demand conventional offset print company really needs to think what is the right strategy? Company must make quick decision of strategic planning to meet quick changing market under high risk. Service model innovation is an appropriate approach to build up new competitive advantages for conventional offset printing company.

But while introducing this new model, there are some argument must to discuss:

Who should do technology forecasting? What is the major influence power of technology development trend on the “Technology push” or “Market pull”?

There are many different approach and research methodology to predict the development trend of technology i.e. S-curve analysis [7] and patent analysis [8]. To make a comprehensive survey of printing technology development history, technology trend was led by major equipment suppliers, include Heidelberg, MAN Roland, Scitex, and AGFA, ESKO (BARCO)...etc. all have strong R&D energy to invent new machine and guide the printing technology development line. But face to the market demand, not every client need stochastic screening technology and hi-fi color, if change to market requirement points to analysis the technology trend that will totally different from technology thinking.

What does the technological development trend of printing in market driven philosophy?

Compare to technology driven development trend, lead by market requirement have different essentials to develop technology. The core concept of the composed printing service model is "service oriented". It is to serve clients in service innovation by printing process innovation without any equipment change. What is major technology trend of service oriented philosophy? The major trend are concentrate to internet technology, information security technology and e-business technology, include database management and marketing, digital authority and identity technology, digital work flow management technology are IT field. If focus to printing related technology, automatic imposition, color management, computer to plate, automatic scheduling and printing cost analysis technology and hybrid offset printing machine are important development trends.

It is a compromising approach between printing volume, cost and quality

Composed printing service model put different order in same plate to print. Every individual order come from different client, have different requirement, need different resolution and ask different color density, all of this situation need to compromise to a balance point for every print job. It is that the low cost and fast printing service are the core competencies of the composed service model. Compare to high resolution and high color quality printing it is focus on "acceptable quality", low printing price, and short printing time service.

What is the target market of the composed printing service model?

Print product category that industry contain extremely many, customer of service classification even very much large, different customers need to use different printing technology to print with different production procedure to different printed matters and can't interflow each other. Since the print product classification is quite much and the composed printing service is focused on the core value to offer POD service by offset ink printing service, it is do not suitable for any printed matter category. Analysis the experience that running it in Taiwan can illustrate the target market on those factors are: double-side CMYK print, paper folding is the most allowed conversion treatment, regular size, paper fixed on few category.

To categorize the target market that the composed printing service model can offer good service quality according to the experience of Taiwan are 4 categories:

- 1. Document on demand market.**
- 2. DM / Brochure on demand market.**
- 3. Business card on demand market.**
- 4. Poster on demand market.**

Summarize the major point of this paper by discussing the service and process innovation on the composed printing service model have conclusion below:

* It is a producer service industry of printing industry that has core essence in service.

* Process innovation and service model innovation could be the innovation ways that can help printing company gather competitive advantages.

* The technology development trend analysis through the demand innovated by way of service model innovation is following the ways on IT industry, network technology and e-business. This trend give a notice to printing industry is IT technologies and related technologies are very important to learn to keep competitive advantages in the quickly change market.

Reference Preparation

Note that for references a tab should be placed between the reference number and information; a hanging tab is set to .15 inches. Samples for references styles are shown below. Reference [1] style should be used for books, Reference [2] style should be used for Journals, and Reference [3] style should be used for Proceedings.

After your references, apply the template tag "Title". This tag will align your 2 columns to an equal depth.

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Author Biography

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符合印刷產業經營模式創新前提之印刷科技趨勢分析：台灣合板印刷服務模式的個案研究

摘要：

創新是21世紀企業維護競爭優勢最重要途徑。創新包含很多不同的類型，例如科技創新、產品創新、製程創新、服務創新、商業營運模式創新、以及組織創新等，都是常見的創新途徑。

印刷產業歸屬於生產性服務業，提供生產技術與設備依據客戶的設計與訂單要求完成代工印製。服務的產業常見的包含書籍出版業之書籍印製、廣告業之商業印刷代工、包裝材料代工印製.....等不同的產業類別。傳統上印刷產業提供的代工印製服務，主要是「不同客戶訂單以各自獨立的生產流程進行印製」的程序行之，不同客戶的訂單無法混雜在一個印製流程中進行之。

自從電子商務快速發展，所有產業皆受到巨大的影響而產生變化，不論是服務性產業或是製造業，商業營運模式都受到電子商務影響而產生變革，以迎接21世紀的競爭。大約始自10年前，台灣有少數的印刷公司，開始在電子商務的基礎環境上發展新的商業營運模式，藉著數位化的資訊流程開始提供全新的「合板印刷」商業經營模式，開創全新的依需印刷（Print on Demand, POD）商業服務模式。

這篇論文主要是針對台灣新發展的合板印刷商業營運模式，討論印刷製程所需的製程創新，以及在新的服務流程下所需的印刷技術發展趨勢分析，也討論電子商務環境下印刷技術的發展趨勢。