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## TRIZ helps China e-shopping

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### Abstract

Currently Internet is playing a key role in developing of new business strategies in several industries. In China, huge changes have been made in retailing industry with the help of Internet and the introduction of e-shopping. With a great success of pure on-line shops, such as TAOBAO, traditional supermarkets will also attempt to take their market share back. This paper addresses this challenge of those traditional click-and-mortar (CAM) supermarkets to figure out the important aspects for developing e-supermarkets, especially in the context of logistics and cultural specifics of China. The data for analysis of a challenge has been collected through survey of local residents, and interviews with two senior managers of strategic planning department from the leading supermarkets in China. Problems of e-commerce in China are discussed and resolutions are suggested using TRIZ. This work was presented as masters thesis on Innovation and technology management (ITM) program at the University of Bath.

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### 1. Introduction: market, logistics and cultural environment of e-shopping in China

Internet gradually plays its increasing role in people's daily lives. Internet-based commerce (e-commerce) has been encouraged in most areas, and this trend could continue in the future. According to the report on China's promising E-commerce from the United Nations Conference on Trade and Development (UNCTAD), China had obtained US\$9.33 billion in E-transactions in 2000 [1]. On one hand, Internet infrastructure has been improved due to the accumulated IT knowledge, advanced IT technologies as well, as efforts of many excellent IT researchers during these years. Moreover, it is

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supported by the Chinese government, which invested US\$277 billion in its telecommunications industry to improve significantly the Internet service across China in 2001 - 2009 [2]. It could be a solid basis for further development of E-commerce. On the other hand, the number of Internet users experienced a soaring growth. According to the findings from Miniwatts Marketing Group, the number of Internet users in China has risen from 23 million in 2000 to 513 million in 2012, which topped the world and the penetration rate is as high as 38.4% [3]. Moreover there is an opinion that China would play a leading role in the world's E-commerce development, and even would exert an active impact on the global E-commerce in the next few years. E-commerce now covers areas including on-line stores and malls, searching for jobs, consumers' service, travelling booking, private banking and collaborating on projects.

But it appeared that Western models of E-commerce being introduced to China meet unexpected issues due to market specifics and unique cultural environment. There are two main problem associated with e shopping in China:

- comparing to Europe China has huge and very dense populated cities, which makes goods delivery costly and inconvenient if it is done following the European models of delivery;
- trust remains a key issue with consumer e-commerce acceptance. People need to trust money operation systems and to trust supermarkets that good are in good conditions.

We are going to use TRIZ to address these issues and suggest the new solutions for e-shopping providers in China.

### 1.1. Market

Marketing Strategy could also be another key point for e-tails to develop their business in new environment of virtual reality. With an example of TAOBAO (the leading e-tail in China), Wang and Guo [4] figured out that an integration of cost leadership and differentiation would be better than using each one alone. It is revealed by them that Taobao has used an intermediate to secure the online payment, developed by Wangwang (Internet Market - IM tools) for convenience, and is continuously building its brand amongst customers. Meanwhile, Taobao cut the cost innovatively by Wangwang for customers, and established a fixed alliance with almost all banks in China, so that customers do not have a remittance fee to any bank.

### 1.2. Logistics

Some supermarkets encourage customers to pick up their products ordered online by themselves from the nearest convenience chains or outlets, customers could also search for goods information and collect them at the local shop. Such model is called CAM (click-and-mortar). It could be apparent that e-supermarket with CAM would share the market with traditional outlet and pure online shops. In that case, important elements revealed by other research on e-grocery or the grocery industry could be partially taken into consideration. Moreover, the experience from Taobao would shed light on the further development of e-supermarket with CAM, since its strategies and logistics model could be borrowed. However, lots of research concerning e-commerce would focus on the pure e-tails and nearly none has been published to analyze the market challenges and barriers for e-supermarket before. Relying on dedicated distribution center fulfillment in CAM model may still have problems in China, since remote dedicated distribution center may not be able to secure better service for online customers. According to the interview, current system mainly served for their conventional shops, and the system for an online operation is still at the initial stage.

Compared to relatively smaller cities and towns in the UK, China is a large country with large cities. For instance, the area of Shanghai is 6340.5 square km, which is three times larger than London. With

that consideration, delivery cost for TESCO to continue e-supermarket would be much more than in the UK.

TESCO put a large amount of initial investment to build the fleet of delivery trucks and other necessary infrastructure in China. Since it is the initial period for TESCO to explore the Chinese e-market, the store-based model could be better for its early start. However, the problem is that, unlike the convenience store called TESCO Express around every corner of the UK, TESCO only focused on building up the hypermarkets in China, most of which are not located in the residential districts. That would apparently make troubles if the store-based model were implemented, since it is not beneficial for the rapid delivery.

### 1.3. Culture

Retailers intending to develop their business effectively must understand specifically the linkage between culture and sale promotion. In order to dig into the relationship between Chinese market and culture, McNeill [5] carried out research on the use of, and preferences towards different sales promotion methods in Chinese supermarkets, so as to reveal the potential cultural influence on them. The result showed that the promotional ways to satisfy customers in the supermarket industry are normally based on relationship management and more rewarding shopping experiences. Chinese consumers prefer to make purchase decisions without pressure by sales assistants, and they also show reluctance to 'ask' for special offers or discounts. Moreover, with China's rapid economic growth and relatively lower purchasing power of local customers, Chinese would focus more on food quality and safety problems, due to the consequence of repeated food scandals.

Trust is a key factor for e-commerce acceptance. To be more specific, Chinese avoid uncertainty and may not prefer to shop online because of lacking trust in new products and services. However, there is little knowledge in the acceptance of e-supermarkets with the Click-and-mortar model in China, since it is still a new service for most Chinese CAM groups. For the region/country aspect, e-supermarkets with CAM model are still at the very beginning stage. In order to get rid of limitations caused by location, these supermarkets could learn from other advanced models run by pure e-supermarkets, such as "NO.1" online shop. Although "NO.1" online shop is based in Shanghai, it has built the strategy to deal with other online customers from other cities in China. It has established distribution centers with varied scale according to different market demand in different cities, and then makes use of these centers to satisfy local customers who ordered goods from "NO.1" official website. It gives an idea of how e-supermarkets with CAM model in Shanghai could solve similar problem. Consumers' survey showed the special feature of the Chinese market that needs to be closely paid attention to is trust to the on-line financial operations. Cultural aspects will play a key role in developing of the local market.

Such a multi-national retailer giant as TESCO also attempts to develop its e-supermarket, since it is believed in their rich experiences in operating on-line business in other Western countries, such as the UK. However, after cooperation with local famous e-commerce website TAOBAO, TESCO finally decided to quit the e-market and closed their webpage. During the interview with a senior manager in TESCO Shanghai, some interesting issues have been revealed.

So, we have typical TRIZ challenge – Western models do not work in China due to culture and logistics, hybrid models are possible but need to introduce large changes in current shopping system. "Last-mile" delivery solution should be found.

## 2. Methods and data

This paper focuses on an intensive study of the Chinese e-supermarket with click-and-mortar shops in offering online service. Qualitative methods, such as surveys and interviews, were used. The research should answer the question ‘How could e-supermarket with click-and-mortar shop be widely spread and accepted in Shanghai?’. To reveal the obstacle and conflicts that stop CAM model to soar in China, the interviews with senior manager of E-commerce department of Lianhua supermarket holding CO.LTD and senior manager strategic planning department of TESCO China were conducted. The intention for both companies to develop e-commerce has been explored, and barriers they could imagine or have already encountered have been also revealed. However, both companies understood their own advantages for developing e-commerce, and would take advantage of them.

The customers’ survey in 3 areas of Shanghai has been conducted. Customers’ attitude toward e-commerce has been investigated, where influence of salaries, ages, previous on-line shopping experiences, etc. were taken into account. The survey of 180 adult respondents (equal percentage of both genders) demonstrated that up to 85% residents go to supermarket more than 5 times a week. The survey proved the mature infrastructure of e-market in China (85% of respondents had experience of buying things online).

People with medium income showed strong interest in e-supermarket supported by CAM model and 62% of all respondents would like to do shopping online. But only 15% people tend to buy stuff from supermarket’s websites, and the top barriers they considered is the delivery issue and need of shopping experiences. Also lack of trust in quality is major cultural aspect that e-shopping models should take into account.

After the problems being revealed using the interview and survey, to resolve them we used TRIZ in the following steps – simplified version of TRIZ algorithm [2]:

- Suggest the ideal final solutions for each issue
- Consider the available resources that can be used during shaping the ideal final solutions
- Formulate the conflicts in the same service or process for achieving the ideal final solutions; match the conflicts to the Contradiction Matrix and apply recommended inventive principles to obtain a win-win solution.

### 3. Generating TRIZ solution

After the thorough problem analysis, the last-mile problem (proximity of the delivery/picking up point) should be the one to deal with. TRIZ methodology aims to improve positive aspects without worsening negative aspects. This part would mainly concentrate on the way to solve the problem concerning last mile problem in the delivery process with TRIZ using its simplest tool – Contradiction Matrix (BioTRIZ version) and 40 Inventive Principles.

#### 3.1. TRIZ process: ideal solution

After in-depth analysis on the survey from customers in Shanghai, the top barriers for them to buy goods from e-supermarket supported by click-and-mortar shops are: delivery issues (72% of all respondents). Rather than click on the screen and then spend a long time waiting for their orders to be delivered people will just go to the local shop and buy things. Additionally, compared to going shopping with extra charge, online shopping will cost extra delivery fee, which is thought to be a waste if the order only contains a bottle of mineral water.

The ideal solution can be formulated as: all ordered goods appear themselves in front of the door of the customer’s any time they want regardless to the purchase volume.

However, there are some conflicts in terms of delivery with existing resource availability.

### 3.2. TRIZ process: resources

To achieve the ideal final result TRIZ encourages to make full use of the free or low-cost resources around. With this consideration, all free or cheap resources concerning the improvement of e-service with CAM shops could be taken into account.

Firstly, in terms of logistics, the transportation tool could be a priority to deal with. In order to bring free or relatively cheaper delivery to customers, low-cost transportation tools could be taken into account. Then, to satisfy customers' demand of getting orders anytime rather than waiting for trucks to send orders one by one, more frequent delivery options should be used to build connections with customers and distribution points. In this case, the public transportation, such as underground, could be suggested as the preferable choice. Another reason for choosing underground is that compared to London tube system, Shanghai possesses a more complex underground system, which consists of 12 underground lines. Stations could cover most of the parts of Shanghai especially the inner and middle loop area. According to data from Wikipedia Shanghai underground system was serving 5.78 million passages on average daily in the first quarter of 2012. Underground network has been widely regarded as a daily necessity for most citizens in Shanghai. Consequently, Shanghai underground system could be a reasonable resource we may use.

Secondly, to fulfill customers' demand of collecting orders anytime, small shops and post-offices widely spread in local communities could be another resource. Since these small shops are always near residential areas and stations, it would be an inherent advantage for lower cost for delivery.

Thirdly, other public areas, such as public transport station and parking slots, could be considered as a resource. Although the main function for these places is apparent, it could also be developed for its additional function.

Finally, customers could also be a type of resource. Collecting a small amount of goods on the way after work would be free of charge and save their time of waiting at home.

### 3.3. TRIZ process: contradictions

It will be efficient for supermarkets to deliver orders only for one time with a large bulk, while real orders from customers mainly consist of small packages. In order to satisfy customers' demand, staff could only deliver goods to customers one by one.

- Conflict 1

E-retails tend to deliver goods less frequently in bulk, but customers are always asking for a small amount of goods each time. Retailer wants to improve productivity of selling process, but customers' requirement is to deliver small portions (volume of moving object matrix parameter) contradict to retailer's ideality. Looking at the cells in the cross points between these rows and columns it appears that inventive principles 2, 6, 3, 4, 10 are recommended for resolution of this conflict. It is interesting that "7-eleven" in Japan has already introduced chains as pick-up point for online orders (principles 2 and 4). Inspired by the idea, it could be a way to solve conflict 1 by building small shops in most parts of Shanghai, which may play role as collecting and secondary delivery points. However, it could be expensive for the supermarkets to build many collecting points to cover most of the districts in Shanghai. Moreover, extra labour cost has to be paid to staff work in those new points. Use of local resources would resolve the problem.

- Conflict 2

On the other hand, customers like Internet shopping as it is convenient at the point of order, but they do not have time to pick up the products from the shops or wait till the products are delivered. We would like to improve the lack of time of expected delivery, but loss of energy gets affected (it costs a lot of fuel and

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therefore money for shops to deliver on demand). Recommended inventive principles in the Contradiction Matrix are: 10, 5, 18, 32.

- Conflict 3

Issue of trust: customers would like to improve the convenience of use of the Internet, but object-affected harmful factor is on the way. This gives the following inventive principles: 2, 25, 28, 39.

- Conflict 4

In regards to the requirements to the goods Contradiction Matrix leads us to the following conflicts formulations: quantity of substance as the retailers' requirement vs volume of moving object as customer requirement. Recommended inventive principles are the following: 15, 20, 29.

If a customer specify the time of delivering, as e-tails are not able to control customers' orders in terms of time and amount, it may be inevitable for vans to deliver goods several times a day to the same place. In this case, it could be a waste of energy. Retailer's conflict: if they use large lorries and deliver massive number of small portions of goods to different locations they meet the following contradiction: a retailer wants to improve mass of moving goods vs it own productivity, which gives us the list of recommended inventive principles: 35, 3, 24, 37.

#### 4. Generating TRIZ solution

The possible solutions based on recommended Inventive Principles are listed below. We used the inventive principles that have immediate application to the resources we could think of. But in each particular case of an area or shop specifics other recommended inventive principles could be also applicable. Inventive principles that are not used may be used in local environment for the specific user. Problem of introducing of the e-shopping in Shanghai is multi-contextual. Each conflict manifests itself in three different types of issues – logistics, market specifics and culture. In all the conflicts that we have revealed as the result of literature analysis all three contexts are interconnected and it is difficult to separate them. And maybe there is no need to do this. Approaching the problem from these three different contexts we came to the solution model that resolves them all. Inventive principles that resolve several described conflicts are happened to be the most powerful ones.

##### 4.1. Modification of the process of delivering goods: addressing logistics context.

It is a wise option to divide the whole delivery process into two independent stages: the first stage could be on the way to customers' area, and the second process could be from close places to customers' home. As it is mentioned before, vans have to repeat the first process many times per day due to the orders at different times (conflict 4).

The **first stage** of the delivering process is related to traditional lorry delivery of high volumes and reasonable delivery frequency could be highlighted to raise efficiency. The second process is concerning the very last delivery stage; so customized service could be taken into account (continuity of useful action, 20). With the consideration, it could be better to combine all the first processes in one go to save cost and energy. Using existing small shops collecting points, which are supposed to be in residential areas, could be used to bridge the gap between the first and second processes mentioned above. Vans could send orders firstly to those points, and then as mediator, those small shops or collecting point could deal with those orders later. This is principle of mediator (24) and local quality (3). To increase the degree of freedom and adaptability of logistics we used principle 15 – dynamisation.

The ways to finish the **second stage** of the process could be different, instead of using large vans only as it is done now, customers would be happy to pick up goods they ordered on the way back home (principle 25 – self-service), which would be a no-cost solution for the last mile. Also, low-emission

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transportation tools, such as electric vehicles (cars and even bikes) could be used for delivery in those collecting points to customers nearby (principle 28 – mechanics substitution). It is also a cheap way to solve the last-mile problem, given the use of low-cost electric bikes and low-cost labor in China. Therefore, the combined service, could deal with different problems with different functions of different parts.

#### *4.2. Modification of marketing context*

The principle 10 could inspire e-tails to collect and analyze data on where their orders come from and which district or area has the higher delivery density. Supported by these data, headquarters of distribution centers could take preliminary actions for the ‘future’ orders, so as to further save delivery costs. For Chinese customers proper forecast could be also based on different festivals such as Dragon Boat Festival and Spring festival.

There could be a financial problem, if a supermarket decides to build up chains to cover all parts of Shanghai. With the help of inventive principle number 5 – merging/consolidation – it could be a better choice to cooperate with others. E-tails, especially those foreign giants without convenient shops around, could build relationships with small local shops at residential areas, supply them at discount prices of goods, and let them sell their goods at normal price to earn profits. Then, e-tails could take geographical advantages of these small shops, and make them as collecting points for customers nearby. E-supermarket could also collaborate with Shanghai underground company. Orders could be sub-divided into normal and urgent ones. For the normal ones, they could deal with traditional delivery routine periodically. For the urgent ones, they could be considered to make use of Shanghai underground system to make deliveries continuously.

#### *4.3. Modification of buying process: addressing cultural context (trust and reliability)*

Those small shops could also supply the same goods with the outlets at the same price, so as to satisfy customers’ demands. Those points could be a window for free advertisement. With brochures of the latest discount online and in store, customers would be easily attracted to purchase. Other integrated services, such as bill payment and credit card payment, could be achieved in those points 24 hours per day. Setting up those connecting points between distribution centers and final customers as mediators could be beneficial for both sides. These points could not only save cost for the company, but also supply additional functions mentioned above. This solution follows principle of universality (principle 6), local quality – principle 3 – (small local shops as secondary distribution points and customer’s pick up points) and continuity of useful action and self-service (principles 20 and 25 accordingly).

### **5. Conclusions**

E-supermarkets with CAM model face challenges with their existing logistics systems especially in terms of fulfillment model and last-mile delivery. After comparing the store-based model and special picking-up center model, using TRIZ, we developed a ‘hybrid’ model combining both models together. This TRIZ-based model is able to ensure timeliness of delivery, improves the delivery efficiency and lower the operational cost for existing CAM supermarkets. Moreover, it is beneficial for their future development as well. Meanwhile, advanced transportation and storage technology, such as cooling system and GPS facilities, should be introduced so as to secure the freshness of products during delivery and track the delivery schedule any time. For the last-mile problems, much literature has researched on it, but little particularly targeting the Chinese markets. With the help of TRIZ possible solutions are developed

for last-mile problems, Inventive Principles helped to generate innovative solutions. Therefore, small local shops, convenient collecting points and public transportation as well, as cheap transportation tools for delivery make joint efforts on shaping the effective and efficient last-mile delivery. After the analysis of the cultural factors, it could be shown that e-tail with CAM can win the trust from customers more easily than other pure e-tails. In conclusion, both local supermarkets such as Lianhua and foreign as Tesco, may be inspired by the research from the three aspects mentioned above, and figure out feasible strategies based on their own situation.

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