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STRATEGIC PLANNING FOR TRANSITIONING FROM THIRD- TO FOURTH-PARTY LOGISTICS UNDER E-COMMERCE ENVIRONMENT IN CHINA

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Abstract

Due to the inability of third-party logistics (3PL) to fully adapt to the rapid development of global e-commerce, the supply chain model of fourth-party logistics (4PL) has gradually replaced the former. At present, 3PL in China remains relatively mature, but various logistics enterprises are still comparatively unfamiliar with 4PL. This study compares the different points in executing 3PL and 4PL to analyze the main problems faced by logistics enterprises when transitioning from 3PL to 4PL. The points of comparison include capabilities for logistics operation, information technology application, multi-customer and supply chain management, and change in management. TRIZ analysis is conducted, and nine strategies are designed for improving these four capabilities. The proposed strategies are divided into three phases according to the time frame of implementation: short-, medium-, and long-term. This study provides strategic planning guidelines by solving the key capabilities encountered in the process of transforming from 3PL to 4PL. The results also provide future reference for third-party enterprises that need transformation and help them to successfully transform into 4PL.

Keywords: Fourth-party logistics, Third-party logistics, E-commerce, TRIZ

Introduction

Electronic information technology (IT) and economic globalization are both developing at a rapid pace, thus giving e-commerce an increasingly prominent role in the economic trading activities of many countries. In China, e-commerce has become a trend in the country's foreign trade development. Then, the financial crisis of 2008 paved the way for developing cross-border e-commerce. As a result, several enterprises developed cross-border e-commerce, whose websites continuously explore the global market. The rapid development of cross-border e-commerce enterprises, with cross-border micro-transactions as their main business, has been observed in recent years (Liu, 2012). At present, the global cross-border e-commerce market has a marketing scale of 440 trillion US dollars, accounting for 14% of the overall scale of e-commerce (Liu, 2012). This proportion continues to increase with the gradual development of cross-border e-commerce. Moreover, the scale of cross-border e-commerce has expanded significantly as a result of China's rapid economic growth. Unfortunately, the rapid development of e-commerce and cross-border e-commerce has brought to light the inability of China's third-party logistics (3PL) to meet the growing demand. This inability has paved the way for the emergence of fourth-party logistics (4PL) in the logistics industry. In China, the 4PL business model mainly includes Feng-chao's automatic and intelligent delivery cabinet and Alibaba's rookie post (Zhang and Shang, 2015).

The goods are mainly delivered to customers by air or maritime transportation by cross-border e-commerce enterprises. The 3PL enterprises can provide a wide range of services for customers, such as selecting, custody, inspection, reorganization, packaging, warehouse management and distribution. However, such enterprises often do not have their own direct flights so they outsource these to other shipping or airlines. Certainly, this drastically reduced the logistics service efficiency and response speed of the 3PL enterprises. In comparison, 4PL is committed to providing comprehensive supply chain logistics solutions (Ran, 2004; Li, 2006; Sun and Wang, 2007). Owing to its many advantages, 4PL has become a carrier of cross-border e-commerce companies, allowing them to smoothly expand foreign trade at a crucial time when many other enterprises are expanding their cross-border e-commerce businesses. At present, China's logistics is mainly based on the 3PL system. Although a prototype of 4PL is developed by certain 3PL firms, it is not yet operated on a full scale. In e-commerce development, a complex relationship between the users or providers of 3PL has emerged, which means that all supply chain partners are required to preserve the 3PL relationship. In other words, the transition of 3PL enterprises into 4PL has become a general trend in the rapid development of e-commerce.

In China, the present development of 3PL remains relatively mature. However, logistics enterprises now want to develop international logistics and have sought major changes to achieve this goal (Hao, 2015). The delivery and service quality has replaced the speed of logistics delivery has become the first important factor in user experience. The logistics problems of enterprises can be typically solved by core 3PL features, such as controlling logistics costs and providing efficient logistics. However,

with the rising competition among enterprises and the rapid development of e-commerce, customers now require further services, including e-procurement, order processing, and supply chain management. The limitations of 3PL in cross-regional logistics have become more apparent, and consequently, shifting into a 4PL system has become an important goal for these enterprises. The inevitable transformation of China's 3PL enterprises into 4PL enterprises is important if they want to establish a niche in international logistics (Ouyang, 2010).

As mentioned earlier, China is a country with mature 3PL and 4PL remains a relatively unfamiliar model in various logistics enterprises, let alone transforming enterprises from 3PL to 4PL. Hence, without a precedent, the logistics enterprises in China may be unable to initiate the transformation. Therefore, the current study first integrates the definitions of 4PL proposed by different studies, after which it compares the different parts in the execution of 3PL and 4PL and then analyzes the main problems faced by logistics enterprises while transitioning from 3PL to 4PL. The TRIZ method is used to build corresponding strategies for the main problems identified. Then, short, medium, and long-term strategies are created based on these. With the aim of providing further reference for third-party enterprises that need transformation and enable them to smoothly transition into 4PL, this study provides strategic planning for each problem and solving those issues encountered in the process of transitioning from 3PL to 4PL.

Literature Review

This section presents a summary of the definitions of 4PL proposed and its operation mode according to the contents of the relevant studies.

Fourth-party logistics

The definitions of 4PL vary across the literature and the field in which a study has been made. Table 1 sorts out and summarizes the definitions of 4PL. Essentially, 4PL is a supply chain model that integrates 3PL-based capital, consulting, and other resources in order to manage and apply these resources.

Given that the Accenture Consulting Company owns the registered trademark for 4PL (Dollet and Diaz, 2011), other consultants have used several terms for it, such as "lead logistics provider" (LLP), while providing similar 4PL services. According to Lieb and Kendrick (2003), a 3PL leader is one who leads the 3PL provider and manages the relationship between the user and the overall 3PL, which also includes the relationship with other 3PL partnerships. The difference between a 4PL and 3PL leader is that the former is not necessarily a provider of 3PL. In fact, a 4PL leader can simply be a consulting company that provides logistics management services, as in the case of Accenture. Thus, Lieb and Kendrick (2003) proposed three modes of 4PL operation, details of which are presented below.

Synergy plus model: Although 4PL and 3PL jointly develop the market, the former can assist the efforts of the latter in implementing its plans and ideas; 4PL also provides services, such as supply chain strategy, technology, market entry capabilities, and project supervision, all of which cannot be offered by 3PL. Generally, 4PL tends to work within 3PL

enterprises, and the ideas and strategies are implemented through 3PL as an effective implementer in order to achieve customer service goals. Then 3PL and 4PL will adopt a contractual mutual assistance or a strategic alliance approach in joint market development (Lieb and Kendrick, 2003; Wu and Liu, 2008).

Table 1. Definitions of 4PL

Reference	Definition
Dollet and Diaz (2011)	In 1996, "4PL" was first coined and registered as an official trademark by the Accenture Consulting Company. As a supply chain integrator, 4PL can integrate the resources, capabilities, and technologies of the organization itself and other organizations as well as combine and manage them to design and construct their supply chain to provide a wide range of solutions for customers.
Bade and Mueller (1999)	The 4PL service providers offer services that can provide technology and integrate 3PL organizations.
Foster (1999)	Generally, 3PL is unable to induce the supply chain to reduce costs and improve efficiency continuously as it can only reduce the cost per time. The main reason is that 3PL lacks the integration capabilities of information technology, warehousing capabilities, and transportation service optimization. In comparison, 4PL can provide different logistics services in the integrated supply chain and enables 3PL to have additional professional transportation and warehousing capabilities.
Magill (2000)	4PL provider and its customers are in partnership with each other to provide integrated logistics services. Together, they also manage and optimize the overall supply chain with operational and strategic logistics-related activities.
Copacino (2001)	Ideally, 4PL must establish a high level of IT and logistics analysis capabilities, such as the ability to provide supply chain information visibility, enhanced efficient supply chain planning, and optimal and efficient execution capabilities to achieve the position of a supply chain leader.
Bask (2001)	The contractual relationship between 4PL and the customer is generally lengthy (more than five years), and the length of such a relationship is also an important analytical condition for distinguishing among traditional logistics, 3PL, and 4PL.
Huang (2001)	The core competencies of 3PL operators are largely focused on the logistics capabilities of the transportation and warehousing departments. Here, 4PL aims to improve the effectiveness of enterprise supply chain management by integrating the services of multiple operators to provide different values for each link of the supply chain.
Marino (2002)	The providers of 4PL are mostly senior consultants. Currently, 3PL providers and large-scale transport operators are also moving toward becoming 4PL providers by strengthening their IT capabilities, service items and capabilities, and service scope.
Craig (2003)	4PL provider offers neutral enterprise process outsourcing, and assists in supervising the complete logistics process and relationships among 3PL providers, contractors, and customs brokers. A good 4PL provider can understand and handle the complex needs of various customers.
Gattorna et al. (2004)	As a new business model, 4PL integrates the resources, capabilities, and IT of leading 3PL corporations and other complementary organizations, in order to establish and operate a competitive supply chain.
Han (2005)	4PL service providers must possess the ability to integrate logistics, information, management, and must possess other professional capabilities and provide a window for customers to integrate services. These providers should also establish and maintain a long-lasting 4PL partnership and assist customers in finding ways to constantly innovate.

Solution integrator model: Here, 4PL provides customers with a solution to operate and supervise a complete supply chain. Then, 3PL and its resources and skills will comprehensively be managed by 4PL. As the core, 4PL can integrate the capabilities of various 3PL or service providers to fulfill customer needs and provide its customers with mediation planning to facilitate the supervision and operation of a complete supply chain (Lieb and Kendrick, 2003; Wu and Liu, 2008).

Industry innovator model: In order to obtain greater benefits for the members of the supply chain, 4PL carries out the simultaneous integration and cooperation of the supply chain for different principals in multiple supply chains (Ran, 2004). Here, 4PL first integrates 3PL, then provides overall mediation planning to the downstream customers. The role of 4PL is crucial as it serves as the connection between upstream 3PL and downstream customer groups. Likewise, 4PL can enhance the efficiency of the entire logistics industry through superior operational strategies, technology, and supply chain operations (Lieb and Kendrick, 2003; Wu and Liu, 2008).

It is said that 3PL lacks the ability to operate across the supply chain and strategic expertise required to integrate supply chain processes. In comparison, 4PL can provide technological, warehousing, and transportation services as well as effectively organize the best logistics providers in each segment to form an excellent supply chain management or logistics solution. The advantages of 4PL can perfectly break through the limitations of 3PL, and the large-scale resource integration that it offers can truly achieve the goals of low cost and high efficiency.

Comparison between 3PL and 4PL

Many actual examples have demonstrated that an enterprise's supply chain gradually moves from insourcing to outsourcing. For example, logistics services in Europe have changed from market transactions to outsourcing to warehouses and contractors, then to the current 3PL and 4PL. From insourcing to outsourcing, the service process is provided by third-party goods, and 4PL will be the next major trend in the industry after 3PL. Therefore, a wide range of services should be provided for customers, and specialization in areas of these services must be established. These cues are an important process for the transformation from 3PL to 4PL. In addition to providing physical logistics services, increasing the number of customized services for customers, lengthening contact with customers, strengthening relationships, and improving the supply chain processes are also necessary. To complete these processes, combining management consultancy, IT, and 3PL and other skills is also necessary. Thus, 4PL is said to be a difficult supply chain strategy planner. The difference between 4PL and 3PL is that the former and its main customers frequently appear as joint ventures or strategic alliances. As an intermediary between customers and contact supply chain members, 4PL should assist customers and multiple logistics service providers in coordination, operation, and management.

At present, the performance of 3PL in China is considerable. However, performance in terms of customization and integration synergy remains to be

largely insufficient. Today, 3PL enterprises have gradually realized that they are facing new competitors, such as transportation, cargo contracting, consulting, and software information enterprises and contract manufacturers, who want to develop towards becoming a 4PL provider (Wu and Liu, 2008). Table 2 illustrates the economic and synergistic aspects of the transition from 3PL to 4PL. On the basis of the comparison presented in Table 2, 4PL pays more attention to the coordinated management of the process and customer participation mode than 3PL, that is, increased attention is paid to the operation process of the entire supply chain. In the supply chain, 4PL is more focused and flexible than 3PL on the coordinated management of the process, degree of service provision, and liaison with manufacturers.

Table 3 shows that the integration capability of 4PL is better than that of 3PL in terms of organization, positioning, services, and features. Compared with 3PL, 4PL involves multiple logistics service providers and involves all levels of work in the supply chain. Thus, the cross- functional integration capability is required for 4PL in multi-customer and supply chain management. In terms of logistics operations, 4PL not only possesses the characteristics of 3PL but also holds high levels of management and responsibility that 3PL does not possess. As shown in Table 4, the main difference between 3PL and 4PL is that the latter is relatively dynamic, which is reflected in its accountability for the operation of the entire supply chain. As can be seen, 3PL is only a part of the supply chain and manages operations. However, 4PL holds responsibility for the operation and entire supply chain. Therefore, enterprises should have a strong ability to change management by being able change from partial management of the original supply chain to the management of the entire supply chain as 3PL moves into 4PL.

Table 2. Differences in economics and synergy between 3PL and 4PL

	3PL	4PL
Service provision performance	These are measured by results, quarterly productivity, and costs	Provides a broader measure of performance, which includes customer service and measurement of supply chain strategies, to name a few
Knowledge expertise provided by the service	Low (inefficient execution of standardized work)	High (smooth flow of goods within the system)
Contact window allotted for service providers	Contact window allotted for the contract management and the daily executive level staff	Prefers higher-level supply chain design and strategy collaboration as well as focused contact windows
Participation of the service provider throughout the entire supply chain	Activities and performance of entities involved	Efficient management and coordination of supply chain activities
Strategic information sharing with different vendors	Promotes awareness of changes in equipment, service levels, and other changes, which may have limited impact on 3PL operations	Broader and more comprehensive information sharing, including a list of suppliers and customers, service guidelines, and priorities
Reference	Guo and Wang (2005), Li (2006), Sun and Wang (2007)	Li (2006), Sun and Wang (2007)

As shown in the table, in order to maximize the utility of their free asset use, 3PL utilizes contractual methods to provide specific supply chain and logistics activities. However, its lack of ability in certain areas does not provide comprehensive assistance for customers in managing the supply chain, and investments to promote R&D innovation are low. Moreover, 3PL development is restricted by its limited IT and project management capabilities. As the 4PL is the main provider of the new supply chain business model, it must possess strong leadership ability in gathering the skills and resources of complementary entities (e.g., 3PL, other consulting, and information technology enterprises) for it to develop a competitive supply chain scheme for the customers.

By indicating the commonalities and differences in the above comparisons, we conclude that 3PL enterprises can gradually become 4PL enterprises after improving their capabilities in the following areas: capabilities in multi-customer and supply chain management, IT application, logistics operation, and management changes (Table 5).

Table 3. Comparison between 3PL and 4PL

	3PL	4PL
Service	Intended mainly for transportation and warehousing services	Capable of handling all supply chain level operations
Positioning	Insufficient cross-functional integration of various operational capabilities within the supply chain	Integrator of supply chain elements between multiple logistics service providers and the main consignor
Organization	Provider of professional logistics service	An independent entity arising from a joint venture or long-term contract between the principal and a partner
Features	Combines analytical management with IT to streamline the process by omitting unnecessary processes and reducing costs	Apart from combining the technologies and resources of 3PL, 4PL promotes highly efficient supply chain management to create higher added value
Reference	Li (2007), Huang et al. (2008)	Cheng et al. (2008), Dollet and Diaz (2011)

Table 4. Main difference between providers of 3PL and 4PL

	3PL provider	4PL provider
Main different characteristics	1. Operation-based perspective 2. Performer and implementer 3. Applies static information management practices 4. Takes over just one or some functions of the supply chain 5. Managing other 3PL providers is not required 6. Comprises a single link in the supply chain	1. Macroscopic approach 2. Integrator of multiple capabilities 3. Applies dynamic information management 4. Takes over the entirety of the supply chain 5. Coordinates and manages all 3PLs in the supply chain
Reference	Liu (2003)	Ran (2004)

Table 5. Improvement capability and content during transformation

Improvement capability	Content
Logistics operation	Holds a higher level of logistics operation technology or integrated operation management capabilities based on the 3PL capabilities
Information technology application	Utilization of integrated information to offer comprehensive information management
Multi-customer and supply chain management	The ability to coordinate with and manage the client or the entire supply chain; it can be flexibly managed throughout the supply chain
Change management	Capability to change management practices during transformation

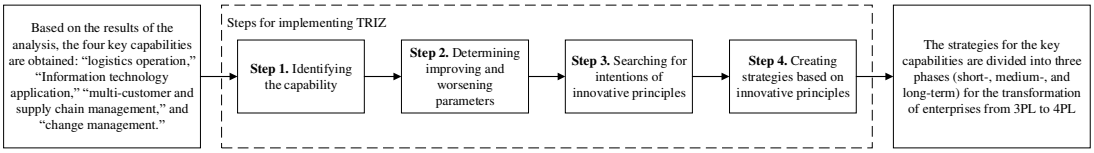

Figure 1. Steps for implementing TRIZ

Construction of TRIZ strategies

Based on the results of the analysis in the previous section, the following key capabilities are obtained: "logistics operation," "IT application," "multi-customer and supply chain management," and "change management." Current 4PL enterprises must understand the key capabilities that they need to possess to maintain their position as China's 4PL providers in future development processes. They must also develop favorable strategies to solve these key capabilities and provide services that can fully meet customers' needs. In this section, the TRIZ method is used in analyzing and exploring various improvement strategies to facilitate the transition of China's 3PL entities to 4PL leaders.

In the analytical application of TRIZ, the following steps are proposed by Savransky (2002): (1) identifying the problem, (2) determining the parameters that improve or worsen, (3) searching for the intentions of innovative principles, and (4) devising strategies based on the innovative principles found in the contradictory matrix and the 40 innovative principles featured in TRIZ theory. Therefore, on the basis of the analysis of the key capabilities that facilitate the transition of 3PL to 4PL in Section 3, we propose several steps. The corresponding parameters that improve or worsene are defined according to the description of the key capabilities. Then, we used the contradictory matrix to determine the innovation principles accordingly. Based on the intentions of the innovative principles, the strategies of transforming enterprises from 3PL to 4PL can thus be established. Finally, we divide into three phases (short-, medium-, and long-term) the strategies for upgrading the key capabilities, which facilitate the transformation of enterprises from 3PL to 4PL (Figure 1).

Capability of logistics operation

Step 1. Identifying the capability

The transportation speed throughout the logistics process has an intuitive influence on customers' evaluation of a logistics enterprise. If a 4PL enterprise can provide a wide range of services but fail to provide timely logistics operations, then customers will question its capabilities in other areas as well. Therefore, the ability to improve transportation speed within the logistics operation is an important indicator that a 3PL can transition to 4PL.

Step 2. Determining improving and worsening parameters

In terms of logistics operation capability, the improving parameter is "9. Speed." From a customer's perspective, the costs incurred while attempting to achieve speedy operation is another problem that should be considered. If speed is the only target being pursued, then the logistics enterprise would simply opt for high-cost air transportation for all modes of transportation. In line with satisfying the speed requirement, 4PL providers must also be able to control the cost of transportation. Therefore, "23. Waste of substance" can be regarded as a worsening parameter.

Step 3. Searching for intentions of innovative principles

According to the improvement parameter "9. Speed" and worsening parameter "23. Waste of substance," the innovation principles of logistics operation capability corresponding to the contradiction matrix are "Principle 10. Preliminary Action," "Principle 13. Inverse," "Principle 28. Mechanics Substitution," and "Principle 38. Boosted Interactions." Two innovation principles are selected, namely, "Principle 10. Preliminary Action" and "Principle 13. Inverse," based on the intentions of the innovative principles.

Step 4. Creating strategies based on innovative principles

The intention of "Principle 10. Preliminary Action" refers to the process of pre-importing useful actions into an object or system. The 4PL provider offers customers with a supply chain service, and from the beginning of the entire supply chain, it must provide customers with the entire logistics delivery plan. In terms of logistics delivery, the 4PL provider must understand the customer's trade-off between speed and cost before creating bespoke logistics delivery methods for the customers.

The intention of "Principle 13. Inverse" is to induce the fixed portion to move even though the movable portion is fixed. In an ordinary 3PL enterprise, it is the enterprise itself that determines the logistics delivery method is to be used. As the customer provides the goods, the 3PL enterprise implements transportation according to its inherent logistics delivery mode. Hence, the fixed part of the logistics mode, which is inherent in 3PL, is transformed into a movable segment. This means that the logistics delivery mode can be flexibly changed and tailor-made according to the specific needs of different customers. This aspect makes 4PL superior to 3PL. Moreover, 4PL can create an appropriate supply chain model for customers, especially in terms of logistics transportation. Therefore, the process of weighing the various requirements required by each customer is a necessary part of devising an efficient plan.

Information technology application capability

Step 1. Identifying the capability

The capability to apply IT is key to the efficient and fast operation of the entire logistics process. With the development of electronic information and two-dimensional (2D) code technology, the kind of IT being applied in logistics is becoming increasingly advanced. Each logistics enterprise has its own IT system. Apart from allowing the staff to track the flow of items throughout the country and around the world, this system is capable of providing customers with the cargo transfer capability.

The information system of an excellent 4PL enterprise should promptly provide feedback to customers apart from tracking the process of cargo transfer. As such, 4PL enterprises should have a comprehensive information collection and feedback mechanism in this series of feedback processes.

Step 2. Determining improving and worsening parameters

We focus on the improving parameter "32. Manufacturability." In IT applications, the staff should understand the method maturity of a mechanism being utilized. If the mechanism cannot be understood or mastered, then the information will be unavailable for collection and timely feedback. In this mechanism, the worsening parameter is "24. Loss of information," which means that information loss is naturally unavailable for collection and feedback.

Step 3. Searching for the intentions of the innovative principles

According to improving parameter "32. Manufacturability" and worsening parameter "24. Loss of information," the innovation principles of the IT application capability corresponding to the contradiction matrix are "Principle 16. Partial or Excessive Action," "Principle 18. Mechanical vibration," "Principle 24. Intermediary," and "Principle 32. Color Changes."

Among these parameters, "Principle 18. Mechanical vibration" and "Principle 24. Intermediary" contain the same solution strategy of hiring consultants or introducing new teams or problem-solving experts. Therefore, two innovation principles, namely, "Principle 16. Partial or Excessive Action" and "Principle 24. Intermediary" are adopted.

Step 4. Creating strategies based on the innovative principles

In "Principle 18. Partial or Excessive Action," an excessive action is taken, that is, further information is needed to make additional frequent contacts. In 4PL and between 3PL and customers, increased information should be collected to solve the problems of the latter. Added communication and feedback can enable the easy reflection on and solution to the problem. Therefore, 4PL companies should listen to the customers' needs and feedback so that they can help the latter address their problems.

"Principle 24. Intermediary" aims to use indirect or indirect processes. In a 4PL enterprise, an intermediary information system can be established, which can be operated by three parties. A 3PL enterprise can update the circulation process of goods through this system, and a 4PL enterprise can grasp the circulation process of goods and processing through this system. Customers can ob-

tain the circulation information of goods from this system. In this manner, information loss will be avoided during information processing, and the customer can clearly see the flow of their goods.

Capability of multi-customer and supply chain management

Step 1. Identifying the capability

Multi-customer and supply chain management is said to be the core of 4PL. If a 4PL provider is unable to manage multiple customers, then doing so will lead to customer loss. Similarly, if supply chain management is lacking, the 4PL provider cannot be considered as such and can only be called 3PL. Therefore, a 4PL provider must possess the capability of multi-customer and supply chain management.

Step 2. Determining improving and worsening parameters

In the face of many customers and internal supply chain management, coordinating the problems of all parties is difficult. Thus, the improving parameter is "35. Adaptability." The main improvement of this problem is that the enterprise, department, employee, management system, or response feedback mechanisms should all be versatile and adaptable to changes in the external environment for teamwork or collaborative operation. Coordinating the internal collaborative operation of all aspects of supply chain management in response to customer changes is necessary. In the face of multi-customer and supply chain management, the interlocking operation mechanism of each link may face problems in all aspects, thus the worsening parameter is "14. Strength," which is the capability to resist change when resisting external changes.

Step 3. Searching for the intentions of innovative principles

According to the improving parameter "35. Adaptability" and worsening parameter "14. Strength," the innovation principles of the capability of multi-customer and supply chain management corresponding to the contradiction matrix are "Principle 3. Local Quality," "Principle 6. Universality," "Principle 32. Color Change," and "Principle 35. Parameter Change." From the analysis of various aspects, we thus selected "Principle 3. Local Quality," "Principle 32. Color Change," and "Principle 35. Parameter Change."

Step 4. Creating strategies based on innovative principles

The intention of "Principle 3. Local Quality" denotes that each part of the object can perform a different and useful function. In multi-customer and supply chain management, each department may have a fixed unit or team that is responsible for performing the main duty assigned to the link. For example, some units can specialize in managing and docking customers, designing and providing supply chain solutions, and in managing and matching 3PL as required by customers. Each customer has a dedicated consultant to initiate the supply chain design, track the process, and assume full responsibility. Each department has a division of labor and cooperation, and professionals can propose solutions when customers ask questions or experience problems during the operation.

The intention of "Principle 32. Color Change" means changing the

transparency of an object or its external environment. Transparency in multi-customer and supply chain management can be reflected in the transparent operation of the supply chain. Here, customers can clearly understand the entire supply chain management process and participate in the design of the entire supply chain management, which exerts a positive effect on customers and the entire supply chain operation.

The intention of "Principle 35. Parameter Change" is to change the level of flexibility in providing customers with personalized service throughout the entire supply chain operation. As mentioned in "Principle 32. Color Change," the transparency of supply chain management can be improved so as to allow customers to participate in the designing process, which in turn, leads to personalized service and substantial improvements in customer satisfaction.

Capability of change management

Step 1. Identifying the capability

If an enterprise changes its business model, then a change in the entire operation of the enterprise naturally follows. Therefore, although 3PL is excessive to 4PL, the enterprise must also change its management. This change can come in the form of a change in business strategy, a transfer of people, or a manner of retraining employees.

Step 2. Determining the improving and worsening parameters

Notably, a new operational mechanism should be introduced in the process of transforming management capabilities. Thus, the improving parameter is "10. Force." When introducing or changing an operational mechanism, the employees should re-adapt in the workplace if mobility is allowed among the personnel. If the employees are retrained, then the employees are also familiarized with the new work. Therefore, the worsening parameter can be regarded as "36. Complexity of device."

Step 3. Searching for intentions of innovative principles

According to improving parameter "10. Force" and worsening parameter "36. Complexity of device," the innovation principles of the capability of change management corresponding to the contradiction matrix are "Principle 10. Preliminary Action," "Principle 18. Mechanical Vibration," "Principle 26. Copying," and "Principle 35. Parameter Change." From the analysis of various aspects, "Principle 10. Preliminary Action" and "Principle 18. Mechanical Vibration" are selected.

Step 4. Creating strategies based on innovative principles

The intention of "Principle 10. Preliminary Action" refers to the process of pre-importing useful actions into an object or system. In change management, this intention can be reflected in the act of holding a dialogue with employees before making any changes in management. Managers should communicate fully with employees and solicit their willful participation before mobilizing or retraining. If an employee does not accept or adapt to the transfer or training, then the resulting passive work of that employee will naturally affect the operation of the enterprise.

The intention of "Principle 18. Mechanical Vibration" is to utilize ex-

ternal components to cause oscillation or vibration. In this case, this intention can be understood as hiring a change management consultant or a team providing professional guidance. Thus, the enterprise must provide important information, such as the entire enterprise's operating structure, to the change management consultant or team and actively cooperate with their work. Another intention of "Principle 18. Mechanical Vibration" is to increase frequency. This situation can be illustrated as an increase in the frequency and level of communication. After major management changes, employees may be unfamiliar with their new job responsibilities. In this case, employees must ask questions, communicate with one another, and strive to maximize their work potential.

Strategy summary

In summary, nine strategies have been developed for the improvement of the abovementioned capabilities (Figure 2). To enable these nine strategies to be effectively used, the implementation sequence of these strategies is described in three phases: short-, medium-, and long-term, as shown in Table 6.

First, if a 3PL enterprise seeks to be transformed into a 4PL enterprise, then it must carry out change management. In this change process, a professional consultant team should be hired (S9) in the short-term. The professional consultant team can follow the characteristics of the 3PL enterprise in conducting a special change design. Next, each customer in multi-customer management must have a dedicated team to implement customer tracking and monitoring (S5). The increased transparency enables customers to understand the design and operation of the entire supply chain (S6).

Second, the medium-term strategy consists of effective communication among the 4PL provider, its customers, and other service providers. Strategies, such as pre-understanding the customer's choice between logistics delivery speed and cost (S1) and customer-led delivery (S2), should be customer-centric to design exclusive supply chain logistics for customers during the supply chain design process. Then, a feedback mechanism is established to heed the needs of customers and provide solutions (S3). In this manner, customers can clearly understand the progress of the supply chain logistics.

Finally, the long-term strategy, which should be run through long-term design, is divided into two parts: internal and external. The external part mainly deals with the establishment of intermediary information systems (S4) and the provision of customized services for customers (S7). These two strategies run through the entire supply chain logistics process and should be fully implemented from the customer's first request up until the completion of the step in the process. The internal part requires communicating with various departments and collecting change opinions (S8). To minimize the possible negative impact of such change, this strategy should be implemented from the beginning of the change up until the end of the process.

Conclusion

Due to the rapid development of China's e-commerce market demand, logistics enterprises are now required to reflect upon and act on the changes in market demand, so that they can further meet customer and merchant needs in the process of goods circulation. Currently, the majority of the international

cargo transportation and logistics centers are concentrated in Asia. If China cannot meet the high-quality needs of customers and merchants, then this may allow the international logistics enterprises in the US and Europe to penetrate the local industry. By then, the development of China's logistics industry shall surely face major obstacles and competition.

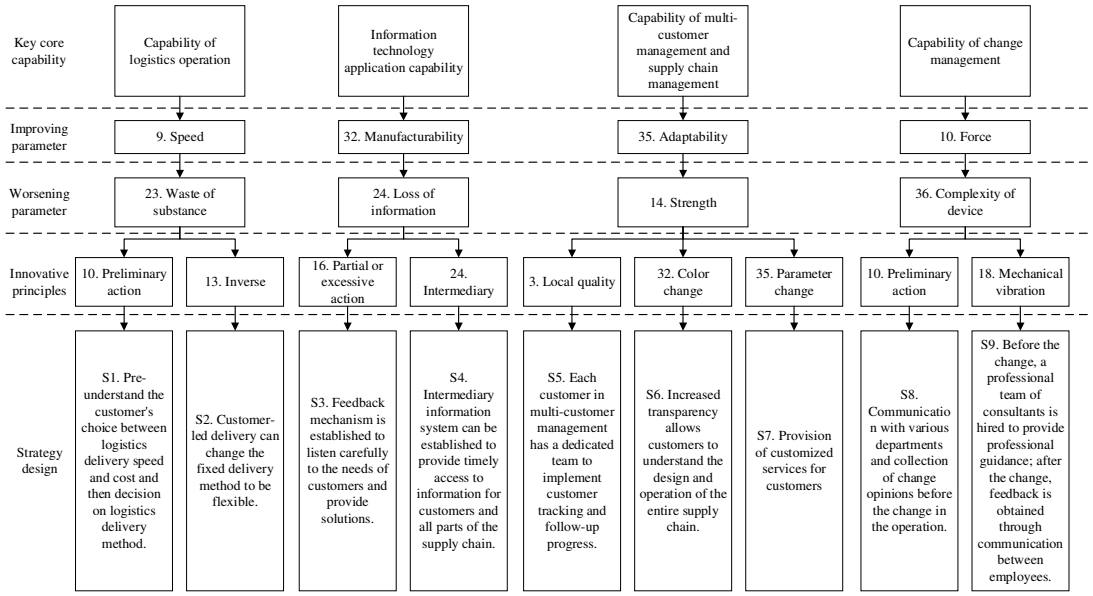

Figure 2. Strategies constructed by applying TRIZ approach

Table 6. Implementation sequence of strategies

Short-term	Medium-term	Long-term
S5. Each customer in multi-customer management has a dedicated team to implement customer tracking and follow-up progress. S6. Increased transparency allows customers to understand the design and operation of the entire supply chain. S9. Before the change, a professional team of consultants is hired to provide professional guidance. After the change, feedback is obtained through communication among employees.	S1. Pre-understand the customer's choice between logistics delivery speed, cost, and decision on logistics delivery method. S2. Customer-led delivery can add flexibility to the fixed delivery method. S3. A feedback mechanism is established to note customer needs and provide solutions.	S4. An intermediary information system can be established to provide timely access to information for customers and all parts of the supply chain. S7. Provision of customized services for customers. S8. Communication with various departments and collection of change opinions before implementing changes in the operation.

A comparison of the differences between 3PL and 4PL indicate that the latter is better than the former. Moreover, we identified four key capabilities to provide logistics enterprises with guide

lines as regards the requirements in transitioning from 3PL to 4PL. These include capabilities of logistics operation, IT application, multi-customer and supply chain management, and change management. Moreover, we developed nine strategies, which are divided into three parts, to help providers improve these four capabilities.

The first part is the process of the logistics enterprise itself. The logistics enterprise is transformed from 3PL to 4PL. Hence, understanding the role of each link is vital. Logistics enterprises should allocate each department with a specific task that it should accomplish and strengthen the links and communication among various departments. The supply chain is a complete process requiring the close coordination of all links. If one department fails to cooperate, then the entire supply chain will be broken, rendering it unable to connect or even operate. In the process of change, introducing relevant logistics talents or training employees to understand and gain familiarity with the operation of 4PL may also be necessary.

The second part deals with customers. As 4PL is customer-oriented, dealing with customers is the core aspect that logistics enterprises should largely focus on when initiating reforms. For example, logistics enterprises should listen to customers' opinions and feedback in the entire supply chain, so that the customers would know that they are at the center of the entire process. A logistics supply chain solution that best suits the customers can then be designed.

The last part is information. One of the advantages of 4PL over 3PL is the former's ability to process large amounts of information more effectively. For manufacturers, suppliers, or customers, the entire supply chain comprises the process of information transfer. Thus, in order to fully utilize information, management methods, such as intermediary information systems, should be introduced into the supply chain.

Reference

Bade, D. and Mueller, J. (1999). New for the Millenium: 4PL Trademark. Transportation and Distribution. 40(2): 78-80.

Bask, A. H. (2001). Relationships among TPL Providers and Members of Supply Chains - A Strategic Perspective. The Journal of Business and Industrial Marketing. 16(6): 470-486.

Cheng, J. H., Chen S. S., and Chuang, Y. W. (2008). A Study of Constructing Fourth Party Logistics' Selection Criterion from Supply Chain Integration and Information Technology Perspectives - An Application of Fuzzy MCDM. Electronic Commerce Studies. 6(4): 401-424.

Copacino, W. C. (2001). 3PL's Narrow the Gap. Logistics Management & Distribution Report. 40(3): 36-36.

Craig, T. (2003). 4PL versus 3PL - A Business Process Outsourcing Option for International Supply Chain Management President LTD Management. World Wide Shipping.

Dollet, J. N., Diaz, A. (2011). Supply Chain Orchestration for the Luxury Alcoholic Beverage Sector. The IUP Journal of Supply Chain Management. 13(3): 42-65.

Foster, T. (1999). 4PLs: The Next Generation for Supply Chain Outsourcing. Logistics Management and Distribution Report. 38(4): 35-35.

Gattorna, J., Selen, W., and Ogulin, R. (2004). Characteristics Strategies and Trends For 3PL/4PL in Australia. ALPHA Research Consortium, Sydney, Australia.

Guo, F., and Wang, H. M. (2005). "4Rs" and Marketing Innovation of the Third Party Logistics Service Provider. Journal of Northeastern University (Social Science). 7(5): 346-349.

Han, F. H. (2005). Opportunities and Challenges of Fourth Party Logistics. Global Logistics Operations e Journal. 22: 36-37.

Hao, H. X. (2015). Analysis of China's Third Party Logistics Cost Control. Prices Monthly. 8: 54-57.

Huang, B. L. (2001). Enterprise Outsourcing Strategies and Challenges. e-Business Executive Report. 18: 12-21.

Huang, F., Shi, X. L., and Dai, X. Z. (2008). Research on 3PL Resource Integration Modern Zhejiang Province. Logistics Technology. 27(2): 25-28.

Li, B. L. (2006). Research on the Development Model and Strategy of the Fourth Party Logistics in China. Science and Technology Information. 1: 133-134.

Li, S. M. (2007). Research and Realization of the Collaborative Logistics Information Management System Based on the Third-Party Logistics, Sun Yat-sen University.

Lieb, R. C., and Kendrick, S. (2003) The Year 2002 Survey: CEO Perspectives on the Current Status and Future Prospects of the 3PL Industry in the US. Transportation Journal. 43(2): 5-16.

Liu, Q. Y. (2003). Design of Third Party Logistics Management Information System. Journal of China Railway. 10: 27-29.

Liu, J. (2012). Application and Implementation of Forth Party Logistics in China's E-commerce, Harbin Institute of Technology.

Magill, P. (2000). Outsourcing logistics: The Transition to 4th Party Partnership in Europe. Informa UK Limited, First edition.

Marino, G. (2002). The ABCs of 4PLs. IIE Solutions. 44(1): 23-23.

Ouyang, L. (2010). Study on Transforming Model of Private Third-Party Logistics to Fourth-Party Logistics, Sun Yat-sen University.

Ran, J. W. (2004). The Supply Chain Integration of the Fourth Party Logistics. Commercial Research. 6: 151-152.

Savransky, S. D. (2008). Engineering of Creativity: Introduction to TRIZ Methodology of Inventive Problem Solving. UK, Taylor & Francis.

Sun, Y. b., and Wang, D. P. (2007). Research on Operational Modes of 4PL and its Development Trend in China. Journal of Beijing Technology and Business University (Social Science). 22(6): 85-90.

Wu, H., and Liu J. T. (2008). Research on Collaborative Relationship between Third Party Logistics and Fourth Party Logistics. Science and Technology Management Research. 28(1): 134-136.

Zhang, H. Y., and Shang, X. (2015). Analysis of Last Mile Distribution Modes for Express Industry: In the Case of Rookie Station and Fengchao Delivery Cabinet. Logistics Technology. 34(11): 48-51.