A MODEL OF RISK MANAGEMENT IN FOURTH PARTY LOGISTICS SERVICE PROVIDER: THEORY AND MEASUREMENT

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ABSTRACT

Recently, there have been many discussions with respect to the most notable inclusion of a 3PL or 3rd Party Logistics, and 4PL or 4th Party Logistics. Various arguments for the necessity, value and role of the 4PL, there is the need for a new level of competency for the Logistics and supply-chain partner of the sophisticated global corporation. Debates have arisen with regards to effectiveness of the 4PL as a ‘lead logistics integrator’ or ‘complexity manager’, providing impartial strategic oversight and higher-levels of holistic management expertise. 4PL’s bring together and centrally manage the complete supply chain for a company or a specific industry, utilizing best of breed 3PL, technology service providers, supply chain specialist or consultants to provide a single supply chain solution that cannot be achieved by a 3PL alone. A 4PL is best described as an entity that positions itself between the manufacturer and the 3PL. Therefore, concepts related to risks management of 4PL must be defined first. The main objectives of this study are to: 1) discuss why risk management is needed in 4PL; 2) outline some of the theoretical underpinnings of 4PL risk management, with an emphasis on risk management of 3PL; and 3) introduce risk measurement methodologies and analytical tools for 4PL risk management as well as performance measurement.

KEYWORDS
Risk Management, Third Party Logistics, Fourth Party Logistics, Business Performance Co-operation

INTRODUCTION

In the logistics industry, risk management concerns with Third Party Logistics Providers (3PL). 3PL is those entities that arrange shipments, as well as manage and provide advice on transportation and transportation-related services for shippers, freight carriers and other related entities. 3PL may include brokers, freight forwarders, rail transporters, consolidators, shippers and air cargo agents. The logistics industry is changing rapidly due to the combination of a de-regulated transportation environment, together with 3PL embracing the internet, e-commerce and other electronic means to provide their logistics services. These changes significantly impact the liability risks 3PL face as these risks are often difficult to predict and equally difficult to "contract away". A 3PL's customer contractually relies on the 3PL to provide secure, trouble-free internet/extranet access and management. When there are problems, the customer looks to the 3PL on a direct party claim. If the 3PL has contracted with an internet/extranet provider, the 3PL
may have recourse against that service provider (assuming the 3PL was able to negotiate contract terms providing such recourse rights), but the 3PL is still liable to its customer and must ensure that its customer is wholly compensated with no gaps. Therefore, the 3PL’s customer has no incentive to "contract away" its rights against the 3PL. Normally, the 3PL’s use a common approach of offering insurance in lieu of contractual guarantees. With regard to Cargo and Property Insurance, inventory shortages are not generally the subject of insurance, being considered instead a normal risk in the course of business. However, 3PL should require a high insurance limit because it is important that the coverages are legal liability driven. No negligence on the part of the 3PL may result in denying of coverage by the insurance company.

For of a 4PL or 4th Party Logistics, there have been many discussions in a recent year. Various arguments for the necessity, value and role of the 4PL, there is the need for a new level of competency for the Logistics and supply-chain partner of the sophisticated global corporation. Debates have arisen with regards to effectivenss of the 4PL as a ‘lead logistics integrator’ or ‘complexity manager’, providing impartial strategic oversight and higher-levels of holistic management expertise. 4PL’s bring together and centrally manage the complete supply chain for a company or a specific industry, utilizing best of breed 3PL’s, technology service providers, supply chain specialist or consultants to provide a single supply chain solution that cannot be achieved by a 3PL alone. A 4PL is best described as an entity that positions itself between the manufacturer and the 3PL. Therefore, concepts related to risks management of 4PL must be defined first. The main objectives of this study are to: 1) discuss why risk management is needed in 4PL; 2) outline some of the theoretical underpinnings of 4PL risk management, with an emphasis on risk management of 3PL; and 3) introduce risk measurement methodologies and analytical tools for 4PL risk management as well as performance measurement.

**LITERATURE SURVEY**

Walters and Halliday (2005) discussed a number of financial performance measures in 4PL. They mentioned that performance measurement is comprised of a range of topics. Essentially, we are considering the effectiveness and efficiency of management decisions. Effectiveness when measured for financial performance includes, returns earned on total capital employed (ROCE) and shareholders' equity (ROE). Financial efficiency measures the utilisation of corporate resources and these are represented by fixed assets and working capital items. Investment performance usually reflects value generated by the business. Measures may be the conventional earnings per share (EPS) or by price earnings ration (PER). Other ratios include the market to book ratio (shares issued multiplied by current share price divided by the value of the company's assets). A positive value indicates that the market values the shares of the firm at a greater value than its assets and consequently the business is seen as adding value for the shareholders. The market value added (MVA) measure does much the same. It is calculated by adding the market value of the company's shares to existing debt and subtracting the capital invested in the business. Again a positive value will indicate a value generating business. MVA is arguably more future orientated as the shares rise; theoretically, this reflects investors' views of future prospects for the firm. The aspect worth note is, these latter two measures, in many aspects are subjective, driven by market perception which can be significantly influenced both positively and negatively by timing and nature of media releases coupled with the general economic climate. While of interest, these measures are not sufficiently absolute to be an effective or efficient monitoring of 4PL performance within an organisation.

Walters and Halliday (2005) stated that economic value added (EVA) which subtracts the cost of capital from the after-tax operating profit for the period (cost of capital being calculated by multiplying capital employed by a relevant weighted cost of capital usually adjusted for industry sector risk). A positive value indicates value has been added during the period. EVA is more orientated toward the current period or recent past. It is not only the profitability of a company that matters, but also the capital needed to obtain that profitability, and its cost. Thus, obtaining a good Profit & Loss result is not good enough. The capital necessary to achieve these results needs also to be measured. Implicit is the need to monitor the cost of capital and assess performance versus that cost. EVA is thus an objective measure that has a start point from which to make a comparison of performance within a relevant financial period (the current position). Because inventory in most organisations forms a significant portion of total asset value, EVA can be considered a good indicator when evaluating 4PL contribution to an organisation.

Alan Win (2008) conducted a research study on the value a 4PL provider that can contribute to an organization. The purpose of this research is to understand the value a fourth-party logistics provider (4PL) can create within an organisation and to identify an appropriate measure of such value creation. The paper presents a conceptual model that is based on research of 4PL implementations within the alcoholic beverage industry, and presents a framework by which contribution by 4PL’s to organisations might be valued. He mentioned that future research may be widened to include financial and service measures within customers and suppliers thereby considering the wider value chain for a given commodity where a 4PL is involved in facilitating delivery of the goods or services. The paper assumes that 4PL providers have the requisite skill set to manage and deliver added value versus an in-house solution. It is anticipated that this paper offers insights into the pre-requisite conditions for a company to consider outsourcing to a 4PL provider, the
conditions/attributes that contribute to securing a 4PL relationship, the value that can be created through use of a 4PL and a method by which to assess the creation of value.

**PROPOSED RISK MANAGEMENT MODEL OF 4PL**

In order to determine the model of 4PL’s risk management, a necessity of differentiation between 4PL from 3PL is required. There are four points as follows:

1. The 4PL is not part of a larger logistics service provider. This contrasts with 3PL who are part of a parent company that provides warehouse, forwarding, transport or other services. Neutrality means objectivity. The 3PL uses the services of the parent company in his offering to customers, whether it fits the needs. A 4PL is an independent who will work with the buyer to design, implement and manage supply chain solutions that meet the client's needs.

2. 4PL is supply chain management service providers; 3PL is logistics service providers. Supply chain management includes logistics services, the same ones that 3PL offer, and how each of these services, including the 3PL, interacts to provide a total supply chain service. 4PL understand build plans, supplier performance, demand planning, inventory velocity and how all those fit into supply chain management. That bundled capability is about moving products from suppliers to customers, whether that is in stores or to customer warehouses in a timely, accurate, complete and lean manner.

3. 4PL may understand that supply chain management is a business process. It is crosses departments and functions; it extends beyond the corporate boundaries to customers, suppliers and logistics service providers. They also understand technology as a vital process enhancer. 3PL are transaction, not process, driven. They focus on the work of shipments or orders. So it is difficult for 3PL to create a value propositions with a customer which, in turn, leads to turnover of customers and relationships.

4. 4PL can work with clients to develop a supply chain strategy. They recognize market, industry, global and technology changes. They know that one approach is not effective to serve different customers and markets. 4PL may understand time-to-market and cycle time in what must be done and how it must be done. And they know that exit strategies may be needed. They do not follow-the-herd. A 4PL is both strategic and tactical. They can work with clients on the "big picture" and the day-to-day. 4PL can manage the details from shipping to order picking to working on weekly buckets for production plans. Because of the strategic and tactical abilities, they recognize risks and can develop risk mitigation tools. This contrasts with 3PL who are tactical only.

These differences mean both 4PL and 3PL can be part of the same buyer's effort, just in different roles. 4PLs can manage 3PLs as part of the outsourcing solution; 3PL cannot manage 4PL. Depending on the project and buyer specifications, the buyer or 4PL can develop the Service Level Agreement (SLA) with 3PL. The SLA should include supply chain metrics that support the deliverables sought from the outsourcing project. What 3PLs do to protect these risks, before a loss occurs, will be a major ingredient in maintaining a strong balance sheet. Some risk will be controlled by transferring it to the insurance market. Other risk may be self-insured, controlled contractually or eliminated altogether by avoiding service offerings that are outside the 3PL’s normal capability. Whatever choices 3PLs make to manage risk, it is clear that these choices must be made in light of a highly litigious business environment. Wrong choices can be devastating and may create circumstances that a 3PL cannot overcome. Therefore, this research proposes a model of risk management that may play a meaningful part in helping 3PL or 4PL effectively manage their operation and business illustrated in Figure 1.
By applying the risk management model above, it is anticipated to be able to control the hazards in their workplace to an acceptable level of risk. Risk management in 4PL stems from internal logistics operations determined by organization’s risk policy. Any related risk reversals may have resulted in considerable financial loss, decrease in shareholder value, damage to company reputations, dismissals of senior management, and, in some cases, the very dissolution of the business. This increasingly risky environment, in which risk mismanagement can have dire consequences, mandates that management adopt a new more proactive perspective on risk management. The ultimate aim of risk management for a proprietary company is usually to protect and enhance shareholder value. The prime objective may be to meet the policyholders' reasonable expectations, thereby the company must have clear business objectives and strategies before a risk management process can be put in place (i.e., hazard identification, risk assessment, and risk control). Also, it is necessary to manage risks to objectives at all levels within the organisation.
THEORY AND DEFINITION OF 4PL'S RISK MANAGEMENT MODEL

Fourth-Party Logistics Provider

A Fourth-party logistics provider (abbreviated 4PL), lead logistics provider, or 4th Party Logistics provider, is a consulting firm specialized in logistics, transportation, and supply chain management. Typical fourth-party logistics providers are CPCS, SCMO, BMT, Deloitte, Capgemini, and Accenture. As the 4PL industry is still in its infancy and currently being created throughout the world, its definition and function still leads to a lot of confusion, even for professionals of the transportation industry (Wikipedia, 2010). A model of 4PL proposed Spectrum – Research & Consultancy Group is illustrated in Figure 2.

FIGURE 2
FOURTH PARTY LOGISTICS MODEL

Source: Spectrum - Research & Consultancy Group (2010)

Win (2008) stated that a fourth-party logistics provider is an independent, singularly accountable, non-asset based integrator of a client's supply and demand chains. 4PL presented in this model of risk management may comprise of 3PL Providers, Management Consultancies, IT Consultancies, and Tech/Software/E-Commerce Firms. A detailed description is shown as follows:

1. Third-Party Logistics Provider

A third-party logistics provider (abbreviated 3PL, or sometimes TPL) is a firm that provides a one stop shop service to its customers of outsourced (or "third party") logistics services for part, or all of their supply chain management functions. Third party logistics providers typically specialize in integrated operation, warehousing and transportation services that can be scaled and customized to customer’s needs based on market conditions and the demands and delivery service requirements for their products and materials. A 3PL is an operator, which specializes in integrated operation, warehousing and transportation services. These services may be 100% outsourced, as in the case of "non-asset based 3PL". It is then a pure 3PL. It may also own part of its operations, such as warehouses, vans, or trucks. It then is both a 3PL and a 2PL, but is usually still called a 3PL. It can also offer genuine supply chain consulting services outside of its usual range of services. It is then both a 3PL and a 4PL, but is usually still called a 3PL. It is important to differentiate 3PL, which actually deliver supply chain consulting services outside of their usual range of integrated operations, from 3PL which use the term consulting or 4PL abusively, as a marketing tool only. Some 3PL currently go as far as giving a title of consultant to their sales people, who are only selling their classical 3PL services (Wikipedia, 2010).
2. Management Consultancies

Management consulting indicates both the industry and practice of helping organizations improve their performance primarily through the analysis of existing business problems and development of plans for improvement. Organizations hire the services of management consultants for a number of reasons, including gaining external (and presumably objective) advice and access to the consultants' specialized expertise. Because of their exposure to and relationships with numerous organizations, consulting firms are also said to be aware of industry "best practices", although the transferability of such practices from one organization to another may be problematic depending on the situation under consideration. Consultancies may also provide organizational change management assistance, development of coaching skills, technology implementation, strategy development, or operational improvement services. Management consultants generally bring their own, proprietary methodologies or frameworks to guide the identification of problems, and to serve as the basis for recommendations for more effective or efficient ways of performing business tasks (Wikipedia, 2010).

3. IT Consultancies

Information technology consulting (also called IT consulting, Computer consultancy, Computing consultancy, technology consulting or business and technology services) is a field that focuses on advising businesses on how best to use information technology to meet their business objectives. In addition to providing advice, IT consultancies often implement, deploy, and administer IT systems on businesses' behalf (Wikipedia, 2010).

4. Technical/Software/E-Commerce Firms

The software industry includes businesses involved in the development, maintenance and publication of computer software using any business model. The industry also includes software services, such as training, documentation, and consulting.

Third-Party Logistics Provider and Customer

For third-party logistics enterprises, commissioned its commitment to the logistics management business is their customer. Because the company bought a third party logistics services, therefore, commissioned a third-party logistics companies and customer relationship exists between the parties, so have customer relationship management. Third-party logistics companies and customers can set up between the long-term strategic cooperative partnership is the development of third-party 3PL logistics enterprises is an important guarantee. The level of third party 3PL logistics service level, strategic goals and corporate culture of intermediation level, division of clarity, balance of interests, the degree of communication and information transparency is an important factor affecting relations between the two. Third party logistics enterprises to establish “all customer-centric” management philosophy, the use of modern information management technology, strategic planning in the development of classified customers, the degree of organizational centralization, management level and the degree of effective integration of design and build customer profiles, to achieve customer feedback, these strategies are the development of third-party 3PL logistics companies have some theoretical guidance (Wikipedia, 2010).

Fourth-Party Logistics Provider and Customer

Generally, 4PL takes the lead on advising or making supply chain decisions on behalf of the customer. The 4PL service provider manages and coordinates the relationship between all the different activities of the consumer (Austega, 2010). It must be able to strategize and manage all the different assets that are dedicated to a customer and, where possible, coordinate break-bulk distribution by co-loading different customers’ products on the same vehicle. This can be done when a 3PL service provider has a great number of customers, thus providing the critical mass to allow break-bulk distribution.
External Factors

1. In-House

The production of some commodity or service, such as a television program, using a company's own funds, staff, or resources.

2. Outsourcing

Outsourcing is often viewed as involving the contracting out of a business function - commonly one previously performed in-house - to an external provider. In this sense, two organizations may enter a contractual agreement involving an exchange of services and payments. Of recent concern is the ability of businesses to outsource to suppliers outside the nation, sometimes referred to as off shoring or offshore outsourcing (which is odd terms because doing business with another country do not mean you have to go offshore). In addition, several related terms have emerged to grasp various aspects of the complex relationship between economic organizations or networks, such as near shoring, multisourcing and strategic outsourcing (Wikipedia, 2010).

3. Business Performance Co-operation

A business organization is owned and operated by a group of individuals for their mutual benefit. Cooperatives are defined by the International Co-operative Alliance's Statement on the Co-operative Identity as autonomous associations of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through jointly owned and democratically controlled enterprises. A cooperative may also be defined as a business owned and controlled equally by the people who use its services or by the people who work there. Cooperative enterprises are the focus of study in the field of cooperative economics (Wikipedia, 2010).

Internal Logistics Operations and Customer

For the internal logistics operations, the overall mission may include: 1) plan, develop, implement and monitor organizational marketing; 2) centralized supply support, property accountability, security coordination, and ADP; 3) system support for unique automated systems; 4) analyze programs and procedures to ensure efficient management; 5) full budgetary responsibilities; 6) develop strategic business and marketing plans; and 7) liaison with the civilian personnel and payroll offices (Defense Logistics Agency, 2010). It is assumed that the internal logistics operations are related to a customer in such a way that the operations are used to fulfill the customer demand with satisfaction.

Risk Policy

Statement of the extent and kinds of risks a firm is willing to take in pursuant of its objectives. It varies from industry to industry and, within an industry, from firm to firm according to the firm's ability to absorb losses and the rate of return it seeks from its operations.

Corporate Performance

1. Earnings

The amount of profit that a company produces during a specific period is usually defined as a quarter (three calendar months) or a year. Earnings typically refer to after-tax net income. Ultimately, a business's earnings are the main determinant of its share price, because earnings and the circumstances relating to them can indicate whether the business will be profitable and successful in the long run (Investopedia, 2010).

2. Shareholder Value

The value delivered to shareholders because of management's ability to grow earnings, dividends and share price. In other words, shareholder value is the sum of all strategic decisions that affect the firm's ability to efficiently increase the amount of free cash flow over time (Investopedia, 2010). It also implies that the ultimate measure of a company's success is to enrich shareholders.
3. Return on Capital

A ratio is used in finance, valuation, and accounting. The ratio is estimated by dividing the after-tax operating income (NOPAT) by the book value of invested capital (Wikipedia, 2010).

Risk Management Process

1. Hazard Identification

Identification and notification of hazards that may affect staff and clients in the workplace or wherever official duties are conducted is the responsibility of all staff. This applies not only to hazards that may affect physical health, such as musculo-skeletal injuries, but also to situations that can lead to mental health issues such as excessive workload, workplace conflict, harassment and bullying.

2. Risk Assessment

Risk assessment means identifying whether the hazard could harm others. However, staff should always be alert to unexpected risks in the health centre and conduct an on-the-spot assessment if required. Wikipedia (2010) also defined risk assessment as a step in a risk management procedure. Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat (also called hazard). Quantitative risk assessment requires calculations of two components of risk: R, the magnitude of the potential loss L, and the probability p, that the loss will occur.

3. Risk Control

It is defined as hedging or neutralising the financial risks that result from one or a series of transactions. For the purposes of this discussion, risk control is the entire process of policies, procedures and systems an institution needs to manage prudently all the risks resulting from its financial transactions, and to ensure that they are within the bank's risk appetite. To avoid conflicts of interests, risk control should be separated from and sufficiently independent of the business units, which execute the firm's financial transactions, (the latter are often responsible for hedging the risks which result from their trades.) In some organisations, risk control work is carried out by independent risk management units rather than specially-named risk control sections, but the difference here is a question of semantics rather than job function (International Financial Risk Institute, 2000).

Optimal Outcome

It is a set of moves or strategies. The outcome is not known from only the set of strategies, but is only realized when the random event(s) are realized.

MEASUREMENT OF 4PL’S RISK MANAGEMENT

Austega (2010) proposed many methods of measuring an enterprise's operational and business risk that have emerged:

1. The Proxy, Analog or Surrogate Method

Measuring the 4PL’s risk is a high level or "top-down" method often used by large companies comprising of several divisions operating independent businesses. The stages of the method are broadly as follows:

1. Identify public companies that are similar ("analogs") to the entity's different divisions either as they are or as they "should be".
2. Identify the capital and other key financial variables of these analog companies and analyse the relationship (including by regression) between the capital and other variables
3. Use this relationship to calculate the amount of capital the division should hold on a "stand-alone" basis according to its key financial variables

This method considers the statistical variability in the earnings of the company, or of its divisions, and either empirically calculates the unexpected loss at a certain confidence level or more likely fits a standard statistical distribution to the available data and analytically calculates the unexpected loss at a certain confidence level. Before the
analysis is undertaken the earnings data needs to be adjusted for risks other than operational risk (with this depending on the definition chosen). Even at the broad definition, this would involve adjusting for the full effect of credit and market risks. The same method can be applied to volatility of asset values, including the market capitalisation of the company, but this is not readily possible for its divisions.

2. The Earnings Volatility Method

This method considers the statistical variability in the earnings of the company, or of its divisions, and either empirically calculates the unexpected loss at a certain confidence level or more likely fits a standard statistical distribution to the available data and analytically calculates the unexpected loss at a certain confidence level. Before the analysis is undertaken the earnings data needs to be adjusted for risks other than operational risk (with this depending on the definition chosen). Even at the broad definition, this would involve adjusting for the full effect of credit and market risks.

3. The Loss Modeling Method

This method collects actual loss data and uses it to derive empirical distributions for its risks. These empirical risk distributions are then used to calculate an unexpected loss amount needing to be protected by a capital buffer. The unexpected loss can be theoretically calculated to any desired target confidence level. This is typically thought of as a "bottom-up" method, but can be done at any level of detail with the loss types able to be defined narrowly or broadly.

4. The Direct Estimation Method

The direct estimation method relies on collaborative line manager judgments to estimate a risk distribution for the risks they run. It explicitly incorporates a layer of subjective judgment based on available loss data and other relevant factors, but these subjective judgments are generally at a lower level of significance than the judgments involved in the other measurement methods. It also provides a forward looking quantification of risk, with the effects of changes in business mix or strategy or structure, readily included in the direct estimation judgment process. The direct estimation method is covered in detail in subsequent pages, but basically involves the selection of a risk distribution shape that is appropriate for the risk (generally allocated by default to the risk category) and then anchoring this risk distribution shape with a quantification of the impact of one or more scenarios (which can include actual risk incidents or near misses). This estimated risk distribution can be refined based on subsequent experience (or as appropriate loss data becomes available).

Referring to the above literature review, this research study will investigate a measurement of 4PL’s risk management by using the proxy, analog or surrogate method, the earnings volatility method, and the direct estimation method. A rational behind is that the proxy, analog or surrogate method undertakes the same approach at the group level and comparing the group results with the addition of the divisional results would allow an estimate of the diversification benefits gained by the group. A method to overcome the insufficiency of loss data proposed by several is to collect industry loss data, with scaling to the size of the entity. Furthermore, direct estimation does not require everyone to duplicate estimates of the same risks. Common risks can be estimated by the appropriate experts who can also define which of the available indicators would be the best proxies of the risk’s incidence. Staff numbers may be suitable for some risks, the number of certain types of transactions for others, and so on.

**DISCUSSION AND RECOMMENDATION**

The trend to identify 4PL’s risk management is of some concern. Throughout this paper, it has commented on the proposed model with theoretical review and introduced risk management methodologies and measurement by using the proxy, analog or surrogate method, the earnings volatility method, and the direct estimation method. The 4PL’s risk management model has been rarely identified and developed, compared to the popular 3PL model. Thereby, considering this model needs a comprehension of both 3PL and 4PL, or other categories of logistics providers (i.e., 1PL or 2PL). The theory and measurement presented here is expected to offer an overview of risk management enabling 4PL organizations to appropriate and effective review and reporting arrangements that reinforce and support risk management activities. This will allow up-to-date and accurate performance information leading to the ongoing identification and monitoring of risks by developing an annual assessment of the effectiveness of the process based on the above methods of measuring an enterprise’s operational and business risk.
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