Book Review

Reviewed by Yulia Panova

Email: panovayulia87@gmail.com

Measuring Logistics Costs – Designing a Generic Model for Assessing Macro Logistics Costs in a Global Context with Empirical Evidence from the Manufacturing and Trading Industries
by: Karri Rantasila
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The usefulness of this milestone work stems from the simple phrase: 'You cannot improve what you cannot measure'. For the first time ever, the components of logistics costs have been systematically analysed from the micro and macro level. The research undoubtedly expands the knowledge on logistics costs' development in countries and brings new insights on the methods of their calculations. The dissertation improves the theoretical approach to the logistics and supply chain management paradigms. For that reason, thesis is valuable for students and faculty staff who can underpin their skills and competencies in dealing with the tasks of the integrated logistics. Additionally, the research findings, methods and algorithms can be readily endorsed and adopted by organisations to provide a better companies' performance.

Mr. Karri Rantasila, the creator of the generic model for assessing macro logistics costs, has a very straightforward goal for countries' performance improvement that inevitably involves measuring of costs. So far, none of the famous indicators for ranking countries globally (e.g., The Global Competitiveness Index, Index of Globalisation, and Global Connectedness Index), addresses macro logistics costs.

The designed generic logistics costs structure, GLOCS, allows to measure logistics costs. The model is based on the data, which was collected through reviewed 66 identified extant publications. Notably, the research review encapsulated sources published in 12 languages: Chinese, English, Finnish, Flemish, French, German, Japanese, Korean, Norwegian, Spanish, Swedish, and Swiss that makes the data reliable and valid. The author stresses that logistics costs are usually studied in a single-country context (92.5% of all studies), while more than half (60%) of these cover multiple themes. The second part of data collection relies on the empirical evidence from the manufacturing and trading industries. More detailed descriptive characteristics on the 'Completion of the study and research methods' are depicted in Chapter 4 (up to 16 pages).

Therefore, the figures, backing the macro analyses of logistics costs around the world, unarguably were not plucked out of the air. Instead, they provide the trustworthy stance of logistics cost in comparable metrics that can be a so-called facilitators, helping out the business manager or the process engineer to contribute into national strategies of country's developments. The created GLOCS model can be readily utilised at companies for the decision-making on the performance of the supply chain elements and the overall delivery of cargo to the clients. A clearly explained methodology of refining the data allows companies to perform the consulting on the logistics costs by themselves in a more simplified technique.

Explaining the relevance of the research, in the introduction (Chapter 1, up to 12 pages), it was underlined that the low logistics cost is a vital pillar of the nations' competitiveness. Repeatedly, the competitive power of the economies can be managed when the level of logistics cost can be measured, preferably in commensurable metrics. In a brief description of the background for measuring logistics cost, the author discusses their following metrics: % of sales or turnover, absolute costs, and % of GDP. The latter metric to disclose the logistics cost greatly increases the comparability of logistics costs in different areas, and hereafter, is suggested as the most appropriate one.

Let alone the proposed method for measuring logistics costs, particularly at the macro level, the author clarifies in Chapter 2 (with a volume of 36 pages) the general definitions and components of logistics cost, which significantly vary through the scientific articles.

The author notes about the first attempt to tackle this problem, which was made by Heskett, Glaskowsky and Nicholas in 1973, representing the total logistics costs as a sum of four types of activities: transportation, inventory, warehousing, and order processing. Since that time, diverse breakdown of logistics costs was advocated among scientific articles, including detailed seven-level breakdown and or even 12-level breakdown. Increasingly, the transport, warehousing, and inventory carrying costs present in many research papers, the author summarises.

Towards one of the research goals concerned with a design of the generic model for measuring macro logistics costs, the author presented a fourfold table of logistics costs (Figure 22) that classify the logistics components from the point of view of their relation to the physical flow of goods. Close related costs are the transportation cost, warehousing, and handling of cargo. More than medium related are named as direct overhead costs (value of time or inventory carrying costs). Less than medium related logistics costs (the cost of packaging material or a new forklift) are the costs that difficult to allocate to a specific function, and therefore, grouped into the indirect function-related costs. The last group, distant-related costs, is attributed to the indirect overhead costs that arise when logistics activities are not working as planned (cost of lost sales, cost of non-marketable goods).

Within the aspects of measuring logistics cost at the micro level, which are presented in the chapter, author stresses a significant effect of outsourcing. This process received popularity in developed countries, resulting in approximate 85% of domestic transportation outsourced in Europe. For international transportation and warehousing, the corresponding rate is around 81%. For that reason, it is essential whether the costs of outsourcing are included in the logistics costs of the company or not. On general basis, the lower the level of outsourcing is, the higher the probability that all relevant logistics costs are perceived as the company's costs.

Alongside outsourcing, the chapter considers another inherent question for measuring logistics costs. In other words is how focally a company arranges its inbound and outbound logistics. One example would be the scrutinising of the delivery terms in accord with the Incoterms. If a company purchases its raw material with ex-works (EXW) Incoterm and delivers products on a delivery duty paid (DDP) Incoterm basis, it may seem to hit larger logistics costs than a company that has arranged its logistics vice versa. Given authors statements, Incoterms make especially international logistics costs difficult to compare.

The continued analysis of macro logistics cost studies is depicted in Chapter 3 (up to 60 pages). The methods of measuring logistics cost at the macro level, by contrast to the micro level, can be multidimensional and complex issue. Meanwhile, the author recognises that the method of activity-based grouping of logistics is employed in many studies, excluding some multi-country statistics-based reports that apply breakdown of logistics costs as internal, outsourced, and inventory carrying cost. The author recognises that approach of grouping is somewhat ambiguous, however, providing some interesting outcome. In particular, as companies are usually able to lower their total costs by outsourcing activities, this may partly explain the lower total logistics costs in the USA (11.4% of sales) vs. 13.4% of sales in Canada.

In general, the level of logistics expenditures has been on the increase in most countries. However, depending on the metrics of logistics cost, the conclusions can be different. For example, the author notes that in the USA between 1985 and 2008, the absolute value of logistics cost has increased, while their level has fallen almost steadily as a % of GDP. This indicates that the economy has grown faster than logistics costs, which is a positive development at least from a logistics point of view.

The logistics costs of Japan also fell, although throughout the 1990s and early 2000s. In 2003, the costs compared to growth of GDP started to rise, reaching 8.9% of GDP in 2007.

In reducing logistics costs, some of the success stories, according to the author, include EU countries, such as the UK, Portugal, Ireland, Romania, and Lithuania that had smaller logistics expenditures in 2010 than in 2005. In Finland, in 2009, the total logistics cost reduced to 11.9% of turnover from 14.2% in 2008. The same levels of total logistics costs were in France – 11.9% (2008/2009) of turnover. However, the French logistics costs' level was lower (9.9%) in 2005/2006, showing their negative dynamics. On general, as the percentage of GDP, the total logistics cost (Europe, 2007) was equalled to 7.0%.

Considering the cost components, transportation costs are the largest individual cost component, followed by warehousing and inventory-carrying costs (in the 2011 edition, this is labelled as capital cost). The share of other groups (order entry and administration) is relatively small compared to these three.

The same case is in the USA, where the transportation costs have formed almost half of the total logistics costs in recent years. The second biggest component has been inventory-carrying costs (22% in 2010), followed by warehousing costs (21% in 2010). Moreover, the author underlines that generally the smaller the company, the greater are the logistics expenditures.

However, the final multi-country study 'State of logistics in the Baltic Sea Region' (3.2.1.5) recognised the negative correlation between the level of logistics costs and company size. The total logistics costs of small companies were roughly 14% of turnover, and medium-sized companies achieved slightly over 13% as the percentage of turnover in 2007.

While most of the thesis is focused on analyses of the logistics costs, one of the biggest insights comes in Chapter 5 (up to 20 pages) 'Generic model for assessing logistics costs' that aims to create and describe this model (GLOCS). The author intended to create the model, which allows one to compare studies that originally employed different cost component breakdowns and means of reporting. Thus, the model makes the results of different studies commensurable. The actual cost input can be done in the cost component fields. It is possible to pick the cost component from 59 logistics cost components based on the outcome of identified extant research. The user may enter up to 16 different cost components from ten different years, allowing the GLOCS Tool to create comparable results from several years. The tool re-classifies different cost components identified in extant research under four generic GLOCS components (market costs, other costs, operating costs, and administration costs). In addition, the tool also possesses an in-built currency converter that automatically converts absolute costs into a common currency (euro) and also presents the costs as a % of GDP. The GLOCS Tool database covers GDP information for 182 countries from 1980 to 2011 (estimation) in current prices. Currency exchange rates are available in 39 currencies from 1980, at the rate of each year's first weekday. After completing the process, the macro logistics costs, originally applying different cost classifications, are possible to be compared.

GLOCS is a feasible tool for converting the results into a more general format as Chapter 6 (16 pages) shows. The outcome of applying GLOCS to refine the industry logistics cost depicted that the logistics costs in North America are lower compared to e.g., Europe. Additionally, among identified GLOCS components, it was found that operating costs accounted for more than half of total logistics costs in almost all studied countries, excluding Canada.

On the ground of the results of the modelling, it was revealed that Europe's logistics markets are characterised by larger operating costs compared to the USA, while market costs are higher in the USA. This could at least partly be attributed to energy (mainly petrol) prices that are lower in the USA due to, e.g., differences in taxation. Interestingly, neither of the logistics studies regarding China or Japan indicated any market costs. The reason for that is that original studies had a component of warehousing costs that may cover both storage and inventory-carrying costs despite the fact that in the majority of studies, inventory-carrying costs comprise its own cost group as the nature of these differs from warehousing/storage costs. Therefore, in GLOCS, the warehousing costs from original studies were attributed to operating costs, but not to the market costs.

On general, most studies indicated a lower level of logistics costs for manufacturing (machinery and process industry) than for trading industries (retail, automotive, and consumer), and what is more important the comparative analytical study evidently showed the significant difference in logistics cost between developed and developing countries.

Chapter 7 (70 pages) applies GLOCS to the data of Finland State of Logistics surveys for comprehensive analysis and discussion of industry-specific logistics costs. The use of GLOCS model does not change the results significantly from the original data. For example, GLOCS addresses the portion of operating costs as highest, which after all are

caused by functions that are the most significant catalysts of logistics costs in the previous analysis (e.g., transportation costs). According to the analysis, the transportation costs represent the largest (4.6%) logistics cost component. The second and the third largest groups of logistics cost identified inventory carrying (3.0%) and warehousing costs (2.6%). Author explains that the relatively high level of inventory-carrying costs can be attributed mainly to long transportation distances both to and within Finland, encouraging companies to increase their inventory levels.

Additionally, dependence between the level of internationalisation and production mode on logistics costs was found. Notably, the total logistics costs rose in exporting and international companies, while domestic companies enjoyed more stable logistics costs that author connects mainly with the increase of prices in the global logistics services.

The author also presents the in-depth analyses of logistics cost components in regard to the manufacturing and trading industries. For example, paper and mining industries operate in global markets with high transport volumes that naturally increase the operating costs. Meanwhile, the market costs are topped by the manufacturing of electrical and optical equipment industry (5.9%) and pulp, paper and paper product manufacturers (5.8%).

The further analysis of logistics cost development within industries was made in regard with two counter-dimensions of GLOCS: administrative-operative and indirect-direct. Market costs and other costs were considered as indirect costs, while operating and administration costs as direct costs. Based on these dimensions and data from Finland State of Logistics surveys, industries were positioned in 'logistics families' – groups of industries with a similar cost structure.

The overall conclusion devoted to final discussions on the review of identified logistics cost is presented in Chapter 8 (up to 12 pages). The outcome indicts a clear difference between the total logistics costs in developed and developing countries in favour of developed countries, where the level of logistics costs is around 10% of GDP, while in the developing countries is approximately 20% of GDP. Therefore, the author's generalised GLOCS model greatly increases the comparability of logistics costs in different areas of global context.

The finding of the thesis improved the methodological approach of comparing the logistics costs across different types of the industries by allowing to compare the level of companies' logistics cost to the average level within the designed similar families (e.g., the manufacturing and trading industries of Finland) and in-depth between each type of industries (e.g., manufacturing of textiles, publishing and printing, retail of food, etc.). By applying the principles of Boston Consulting Diagram (BCG), the author mapped all of the industries in accordance with the level of administrative, operative, direct, and indirect costs. Each industry was assigned corresponding GLOCS types (i.e., five different patterns). These patterns provide a generalised dynamics of logistics costs within a given industry for a better comparison of individual company performance to the middle level. Moreover, created patterns of the possible dynamics of logistics costs' fluctuations among manufacturing and trading companies significantly ease the procedures of verifying an appropriate trend for the companies to reach the prosperity's future goals.

The practical significance of dissertation is in the developed structure, methods and tools for comprehensive analysis and measurement of the logistics costs among companies, as well as for facilitated relative comparison of logistics costs between

different countries that allows improve the efficiency at the micro level (i.e., several elements of the supply chain), as well as the performance of the overall systems of delivering products internationally.

From the global point of view, thesis contributes to the world practice of indexing countries by different barometers. The author classified countries from the general level of the logistics cost that is expected from the developing, developed economies, which makes possible to improve strategies for the countries (e.g., policy making) in respect to the etalon level of logistics costs and the economic state of the countries. Similarly to the logistics performance index, different countries can be considered as over or under performers, in order to prescribe its further assistance for the development.

Based on logistics cost current state presented in the thesis, the potential cost saving can be proposed and, in addition, included into national strategies of country's developments. In the cross-country analysis, the author outlines the logistics costs for South Africa, which can be considered as over performer since 2007. South Africa and South Korea both hit total logistics costs of 12.4% of GDP, which positions them between developed and developing countries.

On the contrary, the total logistics costs in China, which are mainly comprised by three components: transportation, storage and administration, was17.8% of GDP in 2010. Similar logistics cost structure of Thailand (e.g., three cost components: transportation, inventory-holding, including warehousing costs, and logistics administration costs) contributed to total logistics costs of 18.6% of GDP. The highest total logistics costs in both, China and Thailand, are partly attributable to the general stance of development in these countries.

Logistics costs in European countries, Japan, and the USA varied from 6.6% (Switzerland) to 10.1% of GDP (Netherlands). The low level of logistics costs in Switzerland signals the efficiency of their logistics system and infrastructure, given the challenges posed by the country's topography.

The average total logistics cost of the developing countries was found in Morocco (approximately 20% of GDP). The World Bank estimates that logistics costs as a % of GDP in Latin America are significantly higher than the OECD average that is proved by the highest Argentina logistics costs in the region (27% of GDP), followed by Brazil (24.5%) and Colombia (21%). Moreover, the logistics costs of the Latin America countries are relatively higher of some countries of CIS, such as Moldova (22.2%), Albania (19.2%), Ukraine (18% to 20%), excluding Tajikistan (27.2%).

The considerably high level of logistics costs in the developing countries is an issue, which the expert community needs to take responsibility for. The thesis underlines that the logistics costs are such an extraordinary untapped resource for the economic growth. If successful, in China, the reduction of logistics cost by 1% will provide an enormous saving of USD 161.58 million a year, while in Thailand is USD 9.64 million/year. Thus, by recognising the logistics costs in correspondence to the GDP, countries' administrations can provide right decisions for the healing of economy by reducing logistics costs.

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