

IDENTIFICATION OF INNOVATIONS FOR LOGISTICS: A CONTINGENCY APPROACH

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Abstract

According to Schumpeter's innovation theory of profit, the innovation is placed as a core element of an entrepreneur strategy to reduce costs or rise the demand for products, thus to increase the profit. A lot of industry research results verify that theory positively proving that financing innovations leads to the return of 20 %, up to 50 % at the case of successfully commercialised solutions, depending on the case and the method of measuring the impact. However, these reasons show not only how important is the issue of innovations in business theory and practice, but also cause some problems referring mainly to the identification, implementation and assessment of innovation outputs. These problems are appropriate for all industries, including logistics, which 10 % share in GDP in average makes this area of business activity worthy to research. Up to date the logistics literature deals with the mentioned problems of innovations in analytical and separate way, with little attention to a conceptual approach. For instance, there is still a discussion on what can be named as an innovation in logistics, no systematisation works have been done to classify innovations and neither identification nor assessment methodology standards have been created and then applied in logistics practice. Based on the above reasons, the purpose of this article is to formulate a contingency approach as the author proposition to deal with one of the above-mentioned problems, namely identification of innovations for logistics. Thus, the thesis of this article states that the contingency approach is the right method to identify logistics innovations. Due to the nature of contingency approach, the main method to perform the mentioned purpose of this article is a literature review, an analysis of the actual propositions, and creation of conception of the contingency approach for identification logistics innovations. It is supported by modelling method at the form of block scheme of this approach. The proposed thesis is verified according to the confirmation method, by the course of logical reasoning at the form of reduction, induction, and deduction to positively justify the formulated conception. The obtained results of the research process are included at two meritorious chapters of the article. At the first one, actual ideas, conceptions and approaches are analysed. Based on the findings the contingency approach is conceptualised and suggested as the most appropriate attitude to identify logistics innovations at the next chapter. These two chapters are supported by discussion and conclusions, where limitations of the contingency approach are also included.

Keywords: Logistics, innovations, contingency

1. INTRODUCTION

The problem of innovations in logistics is not a new but very important issue. The most disputable one is still the question what is the innovation in logistics exactly? Has it to be really a new solution, which dramatically change the actual logistics processes, or it would be enough if some small improvements would take a place on every day basis? Or speaking more generally, does any solutions that directly or indirectly result in streamlining (improving) logistics processes or systems can be treated as innovative, or not? For example, if a storage process in a warehouse was so far based on the circulation of paper documents, then the purchase of an ordinary computer with a standard warehouse management software can be treated as an innovation at this case or not? Similarly, at the situation of a furniture factory, that suffered a problem of production waste. In this case, the introduction of only one of the 5S concept's principle, namely keeping a workstation clean, although very simple at first sight, after great resistance of employees it began to bring results in reduction of the waste finally. Has such a solution got a character of innovation for the factory and its logistics processes or not? Maybe yes, from the perspective of the factory, but can this solution be also perceived as an innovative

from the theory point of view or logistics practices of other companies? The above-mentioned examples, as well as a lot of other greater or smaller cases of improvements, made during daily logistics operations or over longer period of time, present how important is still the problem, generally included at the question what can be named as an innovation in logistics? This main issue can be supported by some detailed questions related to the problems of how to identify, implement and measure logistics innovations? Looking for answers to these questions at the literature, a lot of theoretical propositions can be found, starting from Schumpeter's innovation theory of profit, through Oslo Manual (OECD) and other papers on innovations or best practices in logistics, including cases finally. However, the literature treats the problem of logistics innovations in a limited, analytical way, with little attention to a greater framework focused on filling a gap between the subjective company (practical) point of view and the objective theoretical approach to innovations in logistics. Thus, the author puts a thesis that a contingency approach is just the right method to combine the both side's views into one general framework to identify logistics innovations. Consequently, the scientific goal of this paper is to elaborate the contingency approach model for the identification of innovations in logistics. To meet this goal a literature review, supported by logical reasoning critique and description modelling, are applied as the main research methods. The research results are included at two chapters. The critique of theoretical propositions is presented at the first of them. The second one covers the model of contingency approach. Next, they are followed by conclusion, according to which logistics innovation is a new or a significantly improved solution in comparison to best logistics practices or benchmarks, and the contingency approach offers a system of internal and external environment elements, where the innovations for logistics can be identified.

2. LITERATURE REVIEW ON THE PROBLEMS OF IDENTIFICATION OF INNOVATIONS IN LOGISTICS

Results of literature study indicate that the main problems in regard to the identification of innovations in logistics are related with:

- logistics innovations' terminology,
- approaches to identify logistics innovations.

There is a lot of literature, which provides study results on the terminology of innovation, so there is no need to repeat them, but to indicate that the most comprehensive output can be found at Drucker [1], Sengupta [2], Garcia and Calantone [3], Suroso and Azis [4], or Oslo Manual [5]. Especially worthy proposition from the innovations' identification point of view is included at the last listed position. Namely, according to Oslo Manual "An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations" [5]. Additionally, Oslo Manual makes difference between an innovation and invention or a novelty and recommends time limitations for innovation surveys as follows: "It is recommended that the length of the observation period for innovation surveys should not exceed three years or be less than one year" [5]. Additionally, some other limitations can be put on understanding the innovation, if supported by public funds. For instance, a country legal act can detail that an innovation activity is a development of a new technology, which offers new or significantly improved goods, processes or services [6], or a government programme can formulate that an innovation is a new technology, if not used longer than 5 years on a world scale, or 3 years on a country scale, or 1 year on a country region scale [7]. Summarising, it can be stated that with no doubt an innovation is a something new or significantly improved, but does it mean that every novelty or invention can be treated as an innovation? Surely not, if no improvement of the actual or potential situation is expected, or even more - measured. It gives the innovation a very practical dimension in the sense of a need to compare or confront with the state of art on a base of assessment criteria to talk about the innovation. Of course, the discussion on what is a new or significantly improved, or what assessment criteria to take, is still open and can differ in relation to a real case; however, these three elements (new, significantly improved, and assessment criteria) should be taken as the main characters of an innovation description.

The above way of defining an innovation is presented on a relatively high level of abstract, so it can be applied to different areas of science and practice, including physics, biology, informatics, business, logistics, and so on. Thus, shifting the course of reasoning into logistics, the concretisation of the definition of innovation in logistics should be done by specifying the area of logistics interest (scope, competency or functionality). Despite of popular opinion on what logistics is, the delimitations of borders for logistics is still an important problem from scientific as well as practical point of view to decide, if a concrete innovation case can be classified as logistics innovation, or maybe IT, production, engineering, financial or other innovation in logistics. Because there is still a discussion on the scope of logistics, an assumption on this issue has to be taken for the purpose of this article. Probably every logistics publication defines logistics scope explicitly (for instance, at the form of research object) or implicitly (contextually), which falls into relatively well established and accepted areas of logistics as physical distribution, sourcing, warehousing, transportation, logistics management or supply chain management. The most widespread and recognised proposition to delimitate the borders of logistics seems to be included at the SCOR model [8]. Based on the assumption that logistics in broad sense is a supply chain management [9], according to the SCOR model, logistics covers five main function areas, namely plan, source, make, deliver, and return. Despite they are distinguished on a high level of abstract, they imply at least one important delimitation, this is between the management level, expressed by the “plan” function, which, if supported by the other management functions, i.e. organisation, motivation and control, can be renamed as “logistics management”, and the rest, executable or managed, four functional areas of logistics. This delimitation is important especially from the point of view of classification of innovations in logistics. While the boundaries of areas designated by the terms source, make, deliver, and return can be disputable, the “logistics management” category is the core of logistics (or supply chain), which cannot be outsourced. In other words, if it is possible to manage logistics operations through outsourcing four of them (according to the SCOR model), namely source, make, deliver, and return, then someone has to make such a decision, i.e. plan the scope and conditions of outsourcing logistics activities, organize outsourcing, motivate outsourcing staff and control the outsourced logistics services, which are provided, for instance, by a logistics service provider (LSP). Thus, logistics management is a special logistics function in relation to the other above mentioned four logistics functions. Hence, strictly speaking, logistics management innovations (new or significantly improved products or processes) should be defined as logistics innovations exclusively, while other logistics innovations of as warehousing, or transportation ones, are more disputable, as these activities can stand independently. However, because logistics is a highly interdisciplinary area of integrated activities, it can be accepted at a broad sense that all the innovations can be named logistics ones if their source comes from generally accepted logistics areas of activities. Consequently, if the source of innovations is out of logistics, for instance an innovation was born by production, HR, finance or IT idea, but is proposed, or has found an application at a logistics process, the author proposition is to name such an innovation as the non-logistics innovation in logistics area, for instance a technical or IT innovation in transportation. Thus, the delimitation line, which is not an area of application, but the area of the innovation’s source, allows to distinguish logistics innovations from innovations in logistics, which can be also of non-logistics provenience. This proposition does not mean that logistics should not search for innovations out of logistics, but it presents only an attempt to define a logistics innovation precisely.

The above discussion on terminology problems shows there are still disputable areas. However, obtained results on understanding innovations, and especially the difference between logistics innovations and innovations in logistics, allow to extend the course of reasoning by methodological approaches to identify innovations in economics and management generally, and detailed in logistics.

The economic approach to innovations is included at the one of the economics fields, which is called “innovation economics” [10]. The most prominent representative of this approach is Schumpeter [11]. He claims that the economic development is a process of interruptive changes, which disrupt the existing state of equilibrium, and that the changes are caused by entrepreneur, who keeps the power to make changes, by means of so called “new combinations” of things and forces, which can be used as a synonym to the term

“innovation”, if looking at the context of Schumpeter vision of innovation [11]. He also enumerates five examples of “new combinations”. They are [11]:

- 1) introduction of a new good, or a new good’s quality for a customer,
- 2) introduction of a new production method,
- 3) the opening of a new market,
- 4) the usage of a new supply source or raw materials,
- 5) introduction of organisational changes.

The above described Schumpeter’s “innovation economics” was, and still is developed by a lot of followers. One of them is a “guru” of management sciences and practice - P. Drucker [1]. Similar to Schumpeter [11], he formulates a theory, supported by many situational examples, on innovations and entrepreneurship, according to which entrepreneur is a core element of innovative activities. He says that “Entrepreneurs introduce innovations. Innovation is a specific tool of entrepreneurship activity (management), which enables resources to create new possibilities to become rich” [1]. He also identifies seven situations to find and implement an innovation. They are [1]:

- 1) non-expected events,
- 2) variances between expected situation and reality,
- 3) process requirements,
- 4) changes at an industry or market structure,
- 5) changes in demography,
- 6) changes in the hierarchy of value, perception, economic climate,
- 7) changes at the knowledge.

Despite the above description of innovation is related to economy, especially to the economic development or cycles and management, some conclusions can be drawn for logistics. Because logistics is in general a part of economic system, and managing element of supply chain specifically, the above approach can be applied to innovations in logistics. In particular, it can be used directly for logistics service providers (LSP), which are indeed business units, operating alone or as a part of a supply chain, that satisfy customers’ needs with special kinds of services. This possibility has been noticed and explored in logistics literature, what will be presented later at this section. However, completely unexplored logistics research area is the perception of logistics innovations from the macroeconomic point of view. From this perspective, logistics is treated as an industry, a branch of an economy with EU (28 countries) GDP share of 10 % [12,13], similar to production, agriculture or trade, which contributes to the macroeconomic growth, if effective (for instance thanks to logistics innovations), or just opposite, to deterioration, if not effective. Other researches present that public money spent on innovations, R&D creates return, which varies from 20 % to 50 %, and is usually 2 to 3 times larger than private returns [14-16]. This perspective opens new possibilities for logistics innovations as a special kind of tool at hands of governments, European or world organisations to meet their political, economic and social aims. Examples are LNG terminals at the ports of Klaipeda (Lithuania) [17] or Krk (Croatia) [18] as important elements of energy safety system and a tool to create a situation of energy independency. Another example is Ministry of Equipment, Transport, Logistics and Water in Morocco with a strategy to “(...) provide logistics services of high quality, (...) reduce logistics costs, (...) accelerate the growth of gross domestic product” [19]. These examples give imaginations how new macro-logistics investments, carried out at real situation, can be powerful. Additionally, their impact on economic systems can be measured by using some formulas, especially SVA, EVA [20].

Returning to the logistics literature study on innovations in LSP, some researches [21,22] show that LSP are not so much innovative as expected, mainly due to the lack of competencies [23] and a strong involvement into satisfying current customers, what limit them to move their resources for seeking new customers or developing new services [24]. Paradoxically, the situation of close relations with customers allows LSP to recognise their requirements, but simultaneously creates them to be myopic in the observation of global market

developments or technologies [25]. This situation results in implementation of small improvements, designed particularly for satisfying expectations of actually served logistics market, instead to look for greater innovations. Thus, the described above Drucker theory on innovations and entrepreneurship can be used by LSP to be more innovative.

The current course of reasoning allows to conclude that the problem of innovations in logistics is multi-dimensional and situational contingent. Thus, the work on elaborating a contingency approach for identification of innovations in logistics is continued at the next section.

3. MODEL OF CONTINGENCY APPROACH FOR IDENTIFICATION OF INNOVATIONS IN LOGISTICS

Contingency approach is one of organization and management theories on the ways of viewing an organisation. This theory includes a set of so called “images of organisation” by the use of metaphor method, thanks to which an organisation as machine, organism, or brain can be identified [26]. Because according to the theory, the organisation, similar to the above-mentioned metaphors, depends on internal subsystems and external environmental factors [26], especially the contingency approach is used to characterise the organisation as follows.

- “Organizations are open systems that need careful management to satisfy and balance internal needs and to adapt to environmental circumstances.
- There is not one best way of organizing; the appropriate form depends on the kind of task or environment one is dealing with.
- Management must be concerned, above all else, with achieving alignments and good fits.
- Different types or species of organizations are needed in different types of environments” [26]

Due to the lack of the best way of organizing and dependency of organisations on environmental circumstances, the contingency approach is sometimes called as a situational approach [27]. Because this approach is applicable to all organisations’ forms, types or species, including logistics, the above description can be used for the purpose to work out a contingency approach for identification of innovations in logistics. First, it is done through little modification of the above description, and second, to find environmental or situational elements, the innovations in logistics depend on. Therefore, the contingency approach for the logistics is formulated as follows.

- There is not one best way of organising logistics; the appropriate form depends on the kind of logistics task and environment one is dealing with.
- Organizational forms of logistics (e.g. LSP, logistics chains, logistics networks) are open systems that need careful logistics management to satisfy and balance internal needs and environmental circumstances.
- Different types or species of logistics organisations are needed in different types of environments.
- Logistics management must be concerned, above all else, with achieving alignments and good fits of logistics organisations.

Thereafter, the above general description of contingency approach for logistics is detailed by elements of situational system for the task of identification of innovations in logistics, and then, for the task of innovation implementation, however it seems to be suitable also for the purpose of assessment of logistics innovations. The course of reasoning is pictured at the **Figure 1** and described as follows. The above-mentioned task,

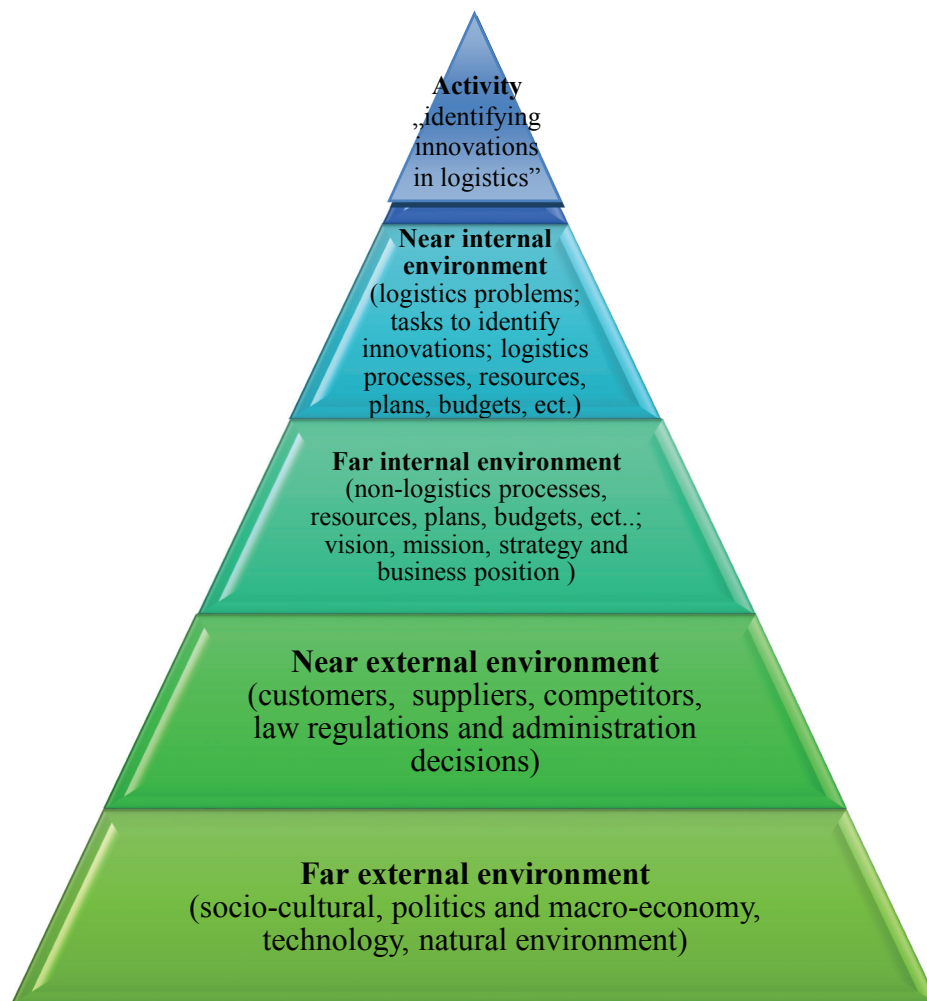


Figure 1 Model of contingency approach for identification of innovations in logistics

particularly at the context of processual approach to logistics, is carried out by an activity, expressed by the verb phrase “identifying innovations in logistics”, to underline that this activity lasts in time and space, thus needs an input, and creates an output. The expected output at this case is just the identified innovation, which subsequently can be adopted or implemented to improve logistics processes. However, to get output, an input is necessary. First, human resources are needed at the form of an owner or performer of the activity, whom the entrepreneur should be, speaking general, or a logistics organisation unit: team or individual, if speaking more detailed, which should include not only logistics managers, but should be extended to an individual person, who is involved at logistics activities directly or indirectly. The logistics human resources need some other resources to perform the activity, mainly information resources on the inventions, which can potentially turn into innovations in logistics. Because these innovations are contingent on environmental circumstances (factors), as well as, the environmental elements can be a source for an invention idea, which potentially can be applied into logistics, thus, secondly, logistics internal and external environment elements should be searched as a source or a limitation for the logistics innovations. The most relevant theoretical propositions, which can be used to identify them, are the concepts of logistics system environment [28] and the structure of market forces [29]. Through adaptation of these concepts to the contingency approach for identification of innovations in logistics, the following four environment elements, which determine the activity “identifying innovations in logistics”, can be specified. They are:

- 1) near internal environment (e.g. logistics problems, tasks to identify innovations, which can be applied into logistics, actual and planned: logistics processes, resources, strategies, plans, budgets, etc.),

- 2) far internal environment (e.g. actual and planned non-logistics processes, resources, strategies, plans, budgets, actual and planned vision, mission, strategy and business position of the whole organisation, etc.),
- 3) near external environment (e.g. customers, suppliers, competitors, law regulations and administration decisions,
- 4) far external environment (e.g. socio-cultural environment, politics and macro-economy, technology, natural environment.

From the above-mentioned environment elements, the tasks to identify logistics innovations seem to be of the most determinant factors for the activity “identifying logistics innovations”. Particularly, the detailed specification of the tasks at the form of text and numerical parameters or variables as for instance: the name of the task, the description of the logistics area the innovation has been looked for, expected improvements, person or a team in-charge with a scope of competence, innovation procedure, time schedule, budget, scope of potential research, planned results, etc., stand for the concrete factors, which determine the right activities to undertake, and limit the other environmental circumstances, i.g. only selected customers will be interviewed, or a selected area of technology will be researched. At the case the tasks for searching innovations are not specified, the next near internal environment element “logistics problems” should help to determine the task and then activities focused on founding the right innovation. It also means that sometimes the description of the logistics problem can be even more important factor then the previous one, because the problem determines task, which determines activity in turn, and selects the other environmental circumstances. At the case the task for searching innovation is limited to a specific area of logistics, the next environment element should be taken under account, namely the other logistics processes, strategy, development plan, etc., both at actual and planned form. It is crucial to consider them if a sub-optimisation of the whole logistics is to be avoided. Otherwise, innovation at one logistics area, i. g. transportation, might deteriorate the performance of the other related logistics area, i. g. warehousing, or opposite.

Because next to logistics, non-logistics processes can be run, as for instance production, finance, sale, etc., so, once more, to avoid sub-optimisation, but within the whole organisation this time, a set of far internal environment elements should be considered. It can appear that the solution for logistics problems (e.g.. lost parcels) is out of logistics function, and lays for instance at IT, finance or sale scope of competence. Therefore, such factors as: actual and planned non-logistics processes, company strategic plans, vision, mission, development plans, staff skills, workload factor, production capacity, financial budget etc., can also determine the innovations in logistics heavily, and opposite, so they should be analysed at mutual relations.

Due to openness of organisations' systems, the external environment elements, including near as well as far factors, should be considered during performance of the activity to find innovations for logistics, mainly, because all the above listed elements might be a source of the innovation idea, or can limit the innovation. For instance, LSP customers (production, trade or service companies, or individuals) can raise a problem, but simultaneously might indicate a way how to resolve the problem, just creating a logistics innovative idea to introduce, particularly at the form of idea on new or changed logistics services. The same situation can occur with suppliers (production, trade, financial, maintain, repair or other service companies), which can be a good source for inventing new partnership relations, for instance. And finally, the external far environmental elements can create opportunity for inventing a new logistics product or a threat, which restrict the possibility of inventions. It is usually easier to be innovative if there is a social, political, technology, economy and nature environmental climate, which stimulates and supports inventors, rationalisers, R&D teams, national or over national research programs etc. However, these macro factors formulate also requirements to meet by a new product, not only bureaucracy, but especially from the point of view of nature sustainability, which particularly for logistics causes difficulties at the form of new, more restricted norms, friendly for the nature, but costly for logistics, for customer and the society at the end. This situation highlights how difficult is to decide about the ranking of the all factors, which should be considered during the activity of identifying the logistics innovation. Sometimes, a change in the customer order parameters may initiate an idea for a new logistics service, while

another time, geographically distant or unexpected nature events as floods, earthquakes, volcanic eruptions, wars, political or social unrest, or economic crisis are turning into critical factors for innovations in logistics. This situation indicates also on a fact that all the above-mentioned environment elements are related to each other, despite of difficulties to identify them.

4. CONCLUSION

Based on the above course of reasoning the following conclusion can be stated. First, the difference between logistics innovations and innovations in logistics should be noticed with a proposition to perceive the first ones as invented by the logistics idea and understand as a new or a significantly improved solution in comparison to best logistics practices, while the innovations in logistics can be also of non-logistics provenience. Second, due to situational dependency of innovations in logistics a contingency approach to identify them is proposed. According to this approach a set of internal and external environment, presented at this article, can stand for a source of identification of innovations, which can be applied into logistics area of activities. Third, because the application of innovations into logistics depends heavily on the real situation, a problem with a direct transfer of one case into another one can be encountered, thus a development of a knowledge data base, which would contain innovations in logistics, implemented as well as potential ideas, which should be classified and assessed, is a suggestion for a further research.

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