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## **LEAN INNOVATION: DESIGN THINKING APPROACH TO LOGISTICS SERVICES DESIGN PROCESS**

*The aim of this paper is to disclose the essence of Lean Thinking concept with regard to services designing. The methodology used in this paper is an interdisciplinary systems approach to Innovation project management by Lean principles and Design thinking.*

*The article shows that contemporary Lean-and-Agile-based innovation management is applied to services designing. It focuses on innovation development of Supply Chain companies that offer logistic services.*

*The Model of the logistic services design process developed in accordance with Design Thinking concept has proposed.*

*The findings identify important implementation aspects when applying to logistic services design process, such tools as Agile–Stage–Gate hybrid model, Set-Based Design, Flexible Design, Value stream analysis and mapping, Morphological box and Logistics Service Map. Furthermore, the potential usage in design process of the Agile Methodologies and CALS technology has discussed.*

*The proposed model and tools may help logistic and service companies to make it easier to offer customer-oriented services and to develop efficient processes, to obtain competitive advantages and use resources sparingly.*

**Keywords:** lean innovation, lean thinking, design thinking, logistics services, design, development management, process, innovation project management

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## **LEAN-ИННОВАЦИИ: ПРИМЕНЕНИЕ ДИЗАЙН-МЫШЛЕНИЯ К ПРОЦЕССУ ПРОЕКТИРОВАНИЯ ЛОГИСТИЧЕСКИХ УСЛУГ**

*Целью данной работы является раскрытие сущности концепции бережливого мышления применительно к проектированию услуг. Методология работы представляет собой междисциплинарный системный подход к управлению инновационными проектами на основе принципов Lean- и дизайн-мышления.*

*Статья показывает, что современный инновационный менеджмент, базирующийся на концепциях Lean и Agile, применим к проектированию услуг. Обсуждаемая в статье проблема сфокусирована на инновационном развитии компаний, образующих цепочки поставок и предлагающих логистические услуги.*

*Предложена модель процесса проектирования логистических услуг, разработанная в соответствии с концепцией дизайн-мышления. Полученные результаты определяют важные аспекты применения при проектировании логистических услуг, таких инструментов как гибридная модель Agile–Stage–Gate, вариативное проектирование, гибкое проектирование, анализ и картирование потока создания ценности, морфологический ящик, карта логистической услуги. В статье также обсуждается возможность использования Agile методологии и CALS технологий при проектировании.*

*Предложенная модель и инструменты могут помочь логистическим и сервисным компаниям сделать проще предложение клиентоориентированных услуг и разработку эффективных процессов.*

**Ключевые слова:** бережливые инновации, бережливое мышление, дизайн-мышление, логистические услуги, проектирование, управление разработками, оптимизация, процесс, управление инновационными проектами

### **Introduction**

The origins of Lean thinking began from the manufacturing Toyota. Nowadays Lean-based guidelines are more and more willingly implemented in various types of business models from manufacturing to IT and software product development. The lean thinking systematic approach encompasses the application

of lean tools for streaming processes of different nature. Such streaming processes as logistic services designing are in focus of this paper.

Often designing processes are managed as a project of research and development (R&D). The project management is a popular tool both for the development of the projects themselves from «idea» to «product», and for planning the output of the products to the market. An area that has received increasing attention in recent years is the area of providing methodologies and a mindset that are required for customer-centric solutions. Managing of development processes in order to achieve maximum efficiency has become the subject of wide spectrum studies. Such sub-concepts as Lean Startup and Lean innovation started to get mass appeal in R&D [1, 2, 3].

This research is based on idea that driving innovation and applying design thinking are an enabler of forward-thinking ideas that spur growth and profitability.

The aim of research is to disclose the essence of Lean Innovation concept with regard to services designing for logistic companies.

The main research issue are (1) how Lean Thinking concept applies in Product Development to increase customer value; (2) what logistics service developing is; (3) what role of usage in service design process of lean-based and digital technology.

Answers may help logistic companies to make it easier to offer customer-oriented services and to develop efficient service processes.

## Results and discussion

### 1. Lean Thinking concept in Product Development

The subject literature provides numerous definitions of such terms as ‚Lean‘, ‚Lean Management‘ and ‚Lean Manufacturing‘ (Gupta et al., 2016) [4]. A few defined it as a way to focus on customer, whereas others viewed it as way of reducing waste and identifying value. Some describes it as an operations strategy that prioritizes flow efficiency over resource efficiency. Lean is about improving quality to eliminate non-value adding activity (i.e. waste) as well as is a cultural transformation that changes how an organization works.

Consequently Lean can be defined as „an integrated multidimensional approach of continuous improvement including variety of management tools based on concept of eliminating waste.”

It is fair to speak that process of designing, creating or updating, marketing and providing a product to a target audience, named new product development, becomes more and more flexible and lean-based [5].

**Lean Product Development (LPD)** based on lean thinking and principles: define and maximize customer value; identify the value stream; make the value-creating steps flow; learn and improve. It includes specific practices that emphasize a necessity to use less of resources, work-in-process, time and cost – to produce something, either a physical product, knowledge product or service product [6].

LPD has incorporated the most valid management practices and technologies such as effective pipeline management, pull scheduling, lean gate review process, minimize multi-tasking, team-based project planning, critical chain project management, proactive risk management [7].

LPD presupposes usage of active design, parallel design and universal training for fine-grained management and organization of rapid knowledge transfer. Combinations of such methods such as Quality Function Deployment, Advanced Product Quality Planning, are used as well as rapid prototyping techniques (e.g. Rapid Tooling, Rapid Manufacturing) used to visualize sketch mockups, design or engineering samples, to quickly fabricate a scale model of a product, tools and functional parts using three-dimensional computer aided design data and 3D printing.

**Agile–Stage-Gate hybrid model.** The classical cascade model (waterfall, WTF) leads to linearity of work performance and significantly increases the project time. To eliminate that limitations one can apply an Agile–Stage-Gate hybrid model (Cooper, 2016) to idea-to-launch processes. A Stage-Gate model integrates with the adaptive project management model Agile to become what Cooper calls the Triple A System: Adaptive and flexible; Agile; and Accelerated [8]. The benefits of this hybrid model are a faster and more adaptive response to changing customer needs, better integration of voice-of-customer and team communication, improved development productivity, and faster to market.

Agile is a flexible iterative-incremental approach to managing projects and products, focused on the dynamic formation of requirements and ensuring their implementation as a result of constant interaction within self-organizing working groups [9]. Agile Methodologies includes Scrum (Crystal, LeSS, SAFe, Nexus et al.), Feature-driven development, Adaptive system development, Dynamic Systems Development Method, Lean Software Development, Kanban.

Agile process takes core idea of Lean to eliminate/reduce non-value-added activities (named «wastes») and thus increase customer value. Lean adds the workflow scheme to process so that each of the iterations is performed equally qualitatively. Kanban principles include: visualize the workflow, limit work in progress, manage and enhance the flow, make policies explicit, and continuously improve. A Kanban board as a tool to implement the Kanban method for projects lets manage the workflow. In Kanban the stages of the workflow are depicted as columns, and the tasks denote special cards. The card moves in stages, like a part in a factory moving from the machine to the machine, and at each stage the percentage of completion becomes higher. At the output, we get the product element ready for delivery to the customer.

## **2. Development of logistics services in accordance with customer's requirements**

The activity of Supply Chain companies is connected by offering logistic services to their customers. Service can be defined as a set of one time consumable and perishable benefits delivered by a service provider commissioned to the consumer needs, which are consumed and utilized by the triggering service consumer [10]. According to CSCMP (2015), logistics include services such as transportation, warehousing, inventory management, packaging, and materials handling, order fulfilment, logistics network design, and supply/demand planning, among others [11]. Logistics service design pays due regard key features of services, namely its inseparability, intangibility, variability, heterogeneity, perishability, lack of ownership.

The ever-growing pressure of the market to improve the business efficiency level has impacted focusing attention to come in the market with new services. A logistic system management faces the problem of improving the level of income by offering new demanded services. By developing of the logistics services diversification strategy it is necessary to create a system of logistics services. One should perform 5 steps [12]:

1. Analysis, market segmentation using functional maps for services.
2. Design of new logistics service. Forming of a competitive Product & Solution portfolio.
3. Development of a flexible tariffs policy for logistics services and its packages.
4. Concretization of sales channel for service packages.
5. Development of a complex of service package promotion.

A core task is to find out methods to shorten R&D lead-times and increase services customer value during design process. Development of logistics services in accordance with customer's requirements is becoming very important activities in order to transform into Agile and Sustainable Supply Chain.

Applying to logistic services a design process can be divided into 6 stages. The schematic view can be seen in Figure.

Stage 1. Empathise is the customer-centric focus research to understand experiences and motivations, desires and needs.

Stage 2. Define is the problem statement on customer's needs and opportunity.

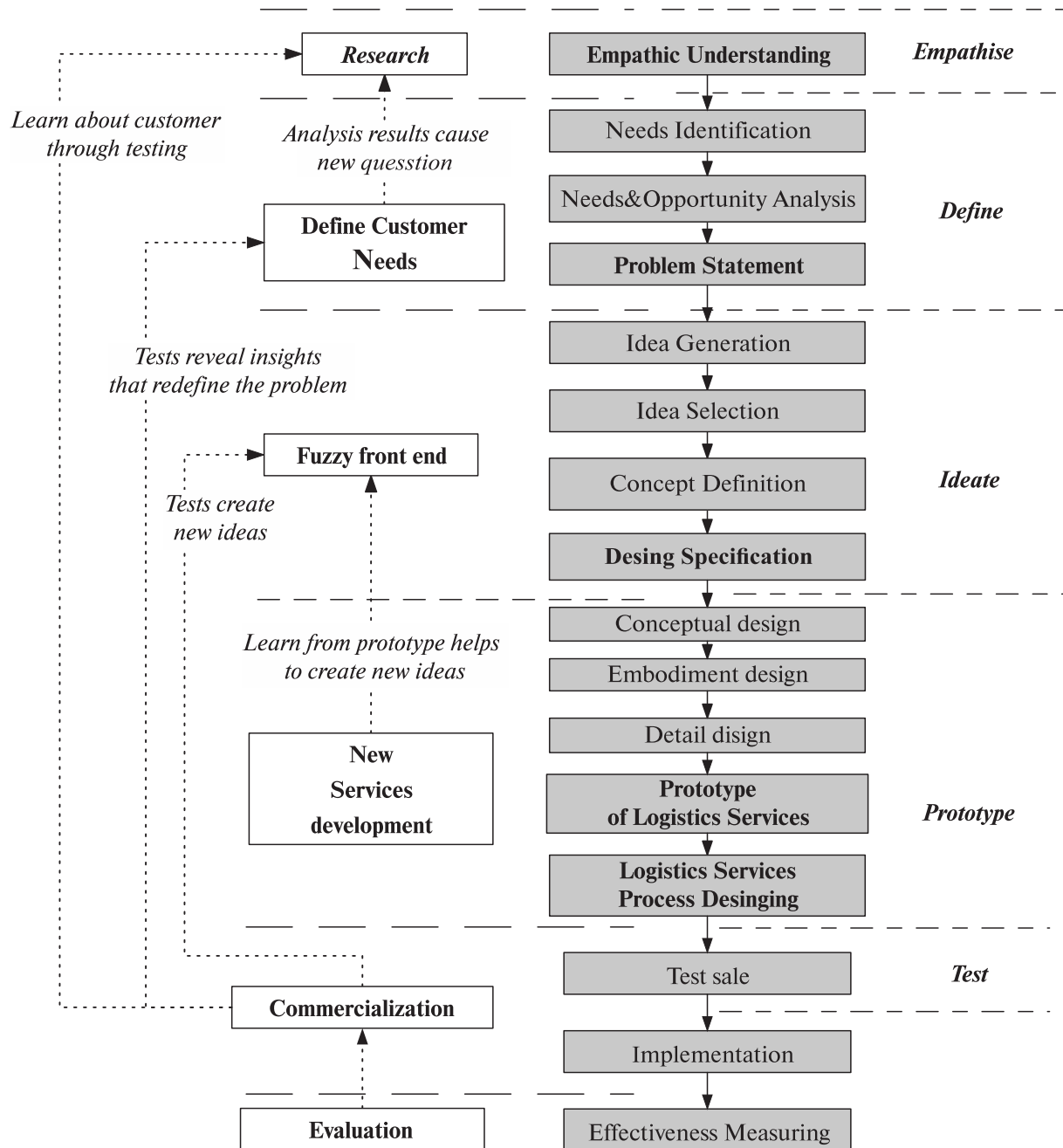
Stage 3. Fuzzy Front End get valued ideas and the Logistics Services concept definition.

Stage 4. New Services Development. As service's generation and consumption occur simultaneously it cannot be produced and stored to be sold at a later stage. So we first prototype has to be made and then the technological process of services designed.

Stage 5. Commercialization when the services appear on the market first for test group, then for all customers when the best possible solution is found.

Stage 6. Evaluation of, achieved results and effectiveness.

Stages do not have to follow linear order due to feedback loops. They can often occur in parallel and be repeated iteratively several times in order to expand the solution space, moreover cycle stops on the best possible solutions.



Model of the logistic services design process

Source: Own Creation.

**3. Lean-based technologies in logistic services design process**

The design process is carried out in conditions of uncertainty and variability. It targets not only the creation of new services with high consumer value due to customer-driven development and quality function deployment, but also speed up time to market. That task is formulating and solving at each of the stages of design, testing, test-result-based improvement, preparation of mass production. But it is the time-to-market for the service and its cost become more important than the contractual obligations in the field of technical characteristics that might be changed during the project time.

The design process is carried out by self-organizing cross-functional project teams. To coordinated and synchronize their activities, to optimize lead time and costs as well as improve the quality of work

one use lean-based managerial tools - Set-Based Design, Flexible Design, Value Stream Analysis and Mapping, Process Mapping and Pipeline Management.

**Set-Based Design.** Theory called set-based design simultaneously explore multiple solutions for every subsystem of both services and manufacturing systems [13]. While designing of logistics service we create virtual model of its structure - prototype. The logistics service prototype is described in terms of essential flows, capabilities and the consumed resources for their operation. They depend on what type of new business model innovation we are establishing, what main drivers and characteristics underpin of it. Morphological box offered for freight and logistics services (Meyer et al., 2018) lets select desired characteristics among wide their variations [14].

We also use the Logistics Service Map (LSM) [15] as a conceptual framework for domain-driven structuring of services as well as their retrieval and combination in order to create complex logistics services. For LSM the main design pattern are (1) Condition of goods and customer requirements, (2) functional Character, and (3) Dimension. Additional sub-concepts and the former subsection allow for an even more detailed logistics services structuring.

Morphological box and LSM gives us possible contributions deferent features of services to a logistics service according to customer-specific demand. As the result we get pool of deferent service are combined with each other and included as service packages into Product&Solution portfolio.

**Flexible Design.** It is useful because allows us to target our experiments more closely, and reduce the waste of time and resources that a blind trial involves [16].

There are several features of flexible design, we should mention some. Development is carried out in short cycles (sprints), after each stage it is possible to return to the previous one. Any elements, parts and module of the service are quickly tested in real market conditions with the help of several clients, the service version they like is preserved into the project as well as consumer's new requirements are entered.

**Value stream analysis and mapping.** By interacting with both customers and internal subsystems, one analyzes business processes from the point of view of their input to delivering value to customers. Map of Value stream

On the one hand, comparison of the added value provided by service processes with client's needs and expectations allows offering services that will be in demand from the market. And, on the other hand, it makes possible to identify and eliminate unclaimed properties of services and its «imaginary» value (the value of the services at the producer's view) in other words eliminate «wastes».

Due to *Continuous Acquisition and Life cycle Support* (CALs) technology we work in a unified information space, exchange data in real time, save versions of the technical design decisions, analyze new product usage reports [17]. Effective coordination is possible through «Cross-cutting» design systems – Computer-Aided Design/Drafting (CADD) / Computer-aided manufacturing (CAM) systems, also known as Computer-Aided Engineering (CAE) systems. CAE means of automation of engineering calculations, analysis and simulation of physical processes, carry out dynamic modeling, verification and optimization of products. 2D or 3D CAD programs can help you draft construction documentation, explore design ideas, visualize concepts through photorealistic renderings, and simulate how a design performs in the real world. CAM means provide automation of programming and control of equipment with numerical program control, robots or automated flexible manufacturing system.

CALs covers the product life cycle totally from the moment of its materialization in R&D step, through the entire production cycle and aftersales service cycle including recovery, reuse and recycling until the time of its disposal, incineration and landfilling.

## Conclusions

The findings show how Lean Thinking tools should be integrated into logistics services development. The integration of the Lean Thinking into innovative processes allows not only improving it but also significantly accelerating the new services market launch. The article has proposed Model of the logistic services design process developed in accordance with Design Thinking concept. Logistic services design process based on lean thinking can improve customer value, reduce development cost and time-to-



market. The proposed model and tools may help logistic and service companies to make it easier to offer customer-oriented services and to develop efficient processes, to obtain competitive advantages and use resources sparingly.

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