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Coexistence of the BRC Standard for Packaging and the Lean Manufacturing methodology

Wiesław Urban, Emil Ratter,
Promporn Wangwacharakul, Bonnie Poksinska

Corresponding author:

Wiesław Urban

Bialystok University of Technology,
Faculty of Engineering
Management, Poland
e-mail: w.urban@pb.edu.pl

Emil Ratter

University of Social Sciences,
Department of Logistics, Poland
e-mail: eratter@san.edu.pl

Promporn Wangwacharakul

Linköping University,
Department of Management
and Engineering, Sweden
e-mail: promporn.wangwacharakul@
liu.se

Bonnie Poksinska

Linköping University,
Department of Management
and Engineering, Sweden
e-mail: bonnie.poksinska@liu.se

ABSTRACT
This study aimed to explore the potential impact of the Lean Manufacturing methodology on the implementation and functioning of the BRC Standard for Packaging. The study highlighted many issues where the Lean Manufacturing concept supports and opposes the BRC Standard for Packaging. A framework for the coexistence of both approaches was determined. The study was of a conceptual nature; it adopted an analytical approach. The approach was based on in-depth consideration of each requirement in the BRC Standard for Packaging s and an assessment of the coherence with the Lean Manufacturing methodology. As a result, many conclusions, clues and challenges were found. The article indicates several areas, in which Lean Manufacturing supports the BRC Standard for Packaging, attributing a special positive role to Lean Tools & Techniques. Also, it indicates six areas, in which the BRC Standard for Packaging contradicts the Lean Manufacturing approach. A comprehensive analysis of the coexistence of both management systems allows a better understanding of challenges while implementing both of them in an organisation. The presented concept of the coexistence of both systems is valuable for management.

KEY WORDS
BRC Standard for Packaging, Lean Manufacturing, Lean Principles, Lean Tools & Techniques, quality management system, system integration

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Introduction

Managers are interested in the integration of the Lean Manufacturing approach with the quality management system of the BRC Standard for Packaging. Processes in individual organisational units of a company should coexist creating a coordinated organism and producing top quality products. Naturally, a management system should be complete and include all relevant aspects required to produce a valuable production output.

The article aimed to investigate the potential impact of the Lean Management methodology on the BRC Standard for Packaging. This study determined areas, in which the Lean approach may have had a positive impact on the BRC Standard for Packaging, as well as fields having major discrepancies. Addi-

tionally, it defined areas of conflict between the Lean Manufacturing and the quality management system of the BRC Standard for Packaging. The study also aimed to outline a framework for the coexistence of both approaches. The study refers to the BRC Standard for Packaging, which is formally known as the BRC Global Standard for Packaging and Packaging Materials.

The article contains a conceptual study and adopts an analytical approach considering formalised requirements of the BRC Standard for Packaging as well as a conceptualisation of the Lean Manufacturing methodology. Lean Manufacturing is reduced to its crucial elements, namely, the Five Lean Principles (Womack & Jones, 1996) and Lean Tools & Techniques systematised into three groups. Both systems were mutually confronted, and their coexistence was assessed in terms of the coherence and challenges during their implementation in an organisation. The confrontation between Lean principles, tools and techniques and requirements of the BRC Standard for Packaging exposed different types of potential impact. The impact was finally systematised and presented in a matrix. Another result of the conceptual work was the recommended framework for organisations using the BRC Standard for Packaging and considering to incorporate Lean Manufacturing. It should be noted that in the process of conceptual inductive investigations, the effective and efficient functioning of the BRC Standard for Packaging system was a prevailing frame of analysis.

Quality management systems, such as the BRC Standard for Packaging or ISO 9001: 2015, need to be constantly developed to meet new challenges of today's dynamic business environment. Many institutions issuing new versions of standards fail to keep up with the production and business needs of modern enterprises. Lean Manufacturing has a potential to enhance quality management systems, and thus, new opportunities generated by Lean philosophies should be discovered and implemented.

1. Lean Manufacturing framework

Organisations often operate in environments characterised by intense competition, continuous technological progress, new consumer requirements, and scarce natural resources (Bhasin, 2012). There has been an increase in consumer demands, which presently relate to not only quality but also the environment, OHS, and sustainability (Souza & Alves, 2017, p. 2668).

The term Five Principles of Lean Manufacturing appeared for first time in 1996 in the book "Lean thinking" written by Womack & Jones. The authors summarised a comprehensive Toyota Production System by just five principles, which are easy to understand in any business environment.

The Five Principles include:

- determine the value from the customer's standpoint (value),
- identify the value stream (value stream),
- value stream optimisation (flow),
- pull: make to demand (pull),
- continuous improvement (perfection) (Womack & Jones, 1996).

Determining the value from the customer's standpoint is a process fundamental for production. Manufacturers and service providers research the market to create products and services that generate maximum benefits for final customers. The value ultimately appears when a customer makes a buying choice and consumes/exploits the product. In the logistics chain, customers are end-users, so the value created is aimed at meeting their expectations. In the age of the Internet, which is a relatively new distribution channel, determining what a consumer expects from a product or service seems to be easier (Loane et al., 2014, p. 2).

Defining the customer groups, which the product or service aims to target, is one of the most important tasks for the team responsible for new product development and launch. The decisions related to new products and services have a profound impact on risk, performance and costs. To determine the product profile, the first step is to collect data representing the different types of customer needs, which the product or service aims to address. This is done by researching client needs, interests, etc. (Yu et al., 1999, p. 5).

The second principle is about identifying the value stream (Womack & Jones, 1996). This principle implies the analysis of material flow and information necessary to deliver the product to the customer. The advantage is the possibility of visualising the value flow and thus enabling each employee to get acquainted with the value stream (Rother & Shook, 1998). The most common method used for analysing the material and information flow is the Value Stream Mapping (VSM) (Manjunath & Shiva Prasad, 2014, p. 100).

Despite the great potential of Lean strategies in performance improvement, there have been many reports of failures due to the confusion about what and how to adopt tools in a specific environment. The implementation of an inappropriate Lean strategy for a given situation can sometimes lead to an increase in waste, cost and production time of a manufacturer. Because of inappropriate selection of lean strategies, changes may cause disruptions in the very process it meant to improve. Therefore, it is crucial to have a systematic method to implement appropriate lean strategies based on identifying wastes in manufacturing processes. As manufacturers who seek advice regarding an investment in new Lean strategies may desire a certain theoretical ground to ensure that their investment decisions are logically sound, it is necessary to develop a methodology to implement appropriate Lean strategies along with proper methodology to evaluate the continuous performance improvement (Karim & Arif-Uz-Zaman, 2013, p. 24).

Value stream optimisation is another principle identified by Womack & Jones (1996). Production processes are perceived from a customer's perspective as streams of values. Value streams are sequentially arranged actions that must be completed so that resources (materials, work and information), can be transformed into products or services expected by customers (Szkudlarek & Zarzycka, 2011, p. 164). By optimising the value stream, the efficiency of the entire process is increased, which is de facto the main goal of Lean. Ensuring the continuity of flow is a key issue of industrial engineering and operational management. Product volatility, which is nowadays natural (constant changes in packaging, designs, graphic design, packaging logistics, etc.), forces production companies to be flexible while maintaining a high level of quality and low failure rate of processes. All this makes the design of production systems more complicated. Product variation may also require frequent adjustments to the production system to maintain high performance. The implementation of the general framework and procedures for the design and engineering of production systems helps eliminate bottlenecks throughout the entire production chain (Chatzopoulos, 2014, p. 180).

The assumption of making to demand is to produce exactly as much as the customer needs. Essentially, the "pull" or "push" system is the concept of material flow between production lines. The "pull" system is one of the Lean Manufacturing tools that implies regulating the flow of unfinished goods in the factory and from external contractors. An effective "pull" system only produces what is needed at the right time. Inventories are maintained at a minimum to meet uncertainties in demand and supply, which is why the use of this system minimises overproduction (Jamaliah et al., 2016, p. 7699).

There are some analogies between "pull: making to demand" and Available To Promise (ATP) – "possible to promise". ATP is a system for providing a control mechanism that calculates whether the desired products from the customer's order can be delivered within the required time. The ATP system also checks the capacity of the plant infrastructure (machines, personnel). Thanks to the professional implementation of the ATP system, it is possible to immediately change the order schedule and help enterprises to establish the right balance between low warehouse costs and high order completion rates (Tinnefesld et al., 2011, p. 1).

The concept of pull is an extremely effective way to organise the production system, but it requires the involvement of the entire production process and auxiliary processes as well as the implementation of high work standards.

Continuous improvement is a routine process of systematically seeking and implementing new and improved working methods. Real sources of advantage can be found in the management's ability to consolidate technologies and production skills throughout the company. Competencies that enable individual enterprises to adapt quickly to changing opportunities while providing a competitive advantage. The strategic goal of an industrial production initiative is to build the ability to quickly and effectively implement improvements as routine activities. To develop this capacity, senior management must provide the organisational vision necessary to guide both business objectives and operational efficiency improvements. Management must enable the development of infrastructure ensuring that the company's strategic production goals are met, and that the efficiency of its production processes is continuously improved (Butler et al., 2018, p. 5).

The Lean Manufacturing methodology is focused on continuous improvement, and not only on correcting errors (Bhasin & Burcher, 2006). The Lean Manufacturing methodology also encourages the improvement of those processes that already work well, so that they are even faster and more effective (Hines et al., 2004). This, in turn, satisfies more customers. Thanks to the benefits gained, more and more

enterprises are deciding to implement Lean Manufacturing. The natural effect is the increased demand for Lean Manufacturing specialists who know the methodology, particular techniques, and, most importantly, can implement them effectively.

The twenty-first-century manufacturing is characterised by customised products. This has led to the complex production planning and control systems making mass production of goods challenging. Many organisations, particularly automotive, struggled in the new customer-driven and globally competitive markets. These factors present a big challenge to organisations to look for new tools and methods to continue moving up the ladder in the changed market scenario. While some organisations continued to grow on the basis of economic constancy, others struggled because of their lack of understanding of the changed customer mindset and cost practices (Fullerton et al., 2003). To overcome this situation and to become more profitable, many manufacturers turned to "Lean Manufacturing". The goal of Lean Manufacturing is to be highly responsive to customer demand by reducing waste. Lean Manufacturing aims to produce products and services at the lowest cost and as fast as required by the customer (Bhamu & Sangwan, 2014, p. 876).

According to scholars, the success of Lean Manufacturing stems from a combination of practices, policies, and philosophies (Simons & Zokaei, 2005, p. 194). While philosophies and policies are very closely related to the Five Lean Principles, practices consist of dozens of daily management methods of the whole organisation, top management, and machine operators (Hines & Rich, 1997; Piercy & Rich, 2015). Lean practices form a separate management toolbox. All of them are subordinated to the practical implementation of Lean Principles and philosophies. Lean Tools & Techniques are referred to standardised work, Just-in-Time supply systems, visual control and many other important tools for Lean issues. In the manufacturing companies, for example, 5S, Kanban, QFD, Poka-Yoke and SMED are used particularly often (Gálová et al., 2018; Shah & Ward, 2007).

Depending on the role they serve in the production system, the tools can be categorised as (1) "diagnostic" – subordinated to the analysis and identification of the system, (2) practical methods of information of the material flow, which can be perceived as "in stream", and (3) methods devoted to organising the workforce for "continuous improvement". The separation of these three types is useful for the investigation of their influence on the BRC Standard for Packaging.

2. BRC Standard for Packaging

Food distribution companies constantly improve the quality of their products, which is why they subject their suppliers to a growing number of controls. At the turn of the millennium, the largest distribution networks on the British market have set a standard that included requirements to ensure the highest quality of offered products. The development of the BRC Global Standards was initially associated with the need to comply with legal requirements, but it quickly turned out that they bring significant benefits to both producers and retailers in the UK, which aroused international interest in this system. The purpose of the audit for the BRC Standard for Packaging is to prepare a report that contains comprehensive information on the functioning of the audited entity. The report includes the assessment of compliance with individual points of the standard. The standard is structured in such a way as to enable objective assessment of operating systems and procedures used by the audited entity. The lead auditor is delegated by the certification body (third party) and tasked to provide an objective and a professional analysis of the company, with a particular emphasis on food safety. Audits conducted by contractors are aimed at checking compliance with contractual requirements and verifications of respect for the work environment (Arfini & Mancini, 2014, p. 1).

The BRC Standard for Packaging is the first industrial quality management system dedicated to the packaging industry. It is a useful tool for packaging sector companies aimed at building and improving quality management systems. The basic requirements of the BRC Standard for Packaging are in line with the requirements of the ISO 9001 system; however, they are strictly adapted to the packaging industry. The safety and quality requirements correspond to the legal requirements in this respect. For many companies, the similarity between ISO 9001 and the BRC Standard for Packaging is appealing as the documentation of these two systems can be compatible with each other with no need for duplication.

The BRC Standard for Packaging covers all important areas in the field of packaging quality assurance. In addition, particular emphasis is placed on issues directly related to food packaging and food

safety. In particular, the BRC Standard for Packaging focuses on issues related to the involvement of top management, risk analysis, internal audits, traceability, cleaning, process monitoring and personnel training.

Many packaging companies partly operate according to the requirements of the BRC Standard for Packaging. However, not all companies are aware of the benefits of a professionally operating system based on the BRC Standard for Packaging. This system is mainly used in enterprises that are suppliers to customers in the United Kingdom. The popularity of all BRC Global Standards is growing, so it can be expected that the BRC Standard for Packaging will become more widespread in the packaging industry (Kawecka, 2014, p. 17).

The quality management system of the BRC Standard for Packaging (formerly BRC/IoP Packaging and Packaging Materials) was created in 2002. It contains requirements for packaging manufacturers, packaging materials intended mainly for food and cosmetics. The BRC Standard for Packaging is one of the leading standards adopted by major retailers and packaging companies from around the world. The fifth edition is obligatory from the beginning of 2016.

The BRC Standard for Packaging was established to help producers meet their legal obligations, as well as to ensure the protection of consumer interests. This quality management system pays special attention to the qualitative and functional aspects of packaging. It contains requirements for safety, production environment and laboratory testing of packaging.

One of the goals of the BRC Standard for Packaging is the systematic training and improvement of professional skills of management and its employees. In this concept, the attitude of the organisation plays a very important role. One of the main goals of the methodology is to implement the systemic thinking among the personnel so that the company is treated as a whole and not only as a part for which individual units are responsible. Adopting such an attitude allows to learn from mistakes and appreciate own success because it is the final product or service that is the value that determines the market and economic success (Kwiatkowski et al., 2017, p. 160).

The BRC Standard for Packaging includes requirements not only for the materials used to produce food packaging but also for other raw materials not necessarily applicable in the FMCG industry (glass, plastic, wood, paper, aluminium, steel). The system also defines two levels of safety risk, which is determined by the final use of the packaging material. Packaging for food storage has a higher level of risk compared to other types (Malon Group, 2018).

Based on the BRC Standard for Packaging, the operation is based on five key factors:

- quality policy: for the packaging quality management system to be as effective as possible, the company's management should construct an ambitious, realistic and clear quality policy;
- risk analysis: the basic elements of the programme is risk and threat assessment based on legal principles;
- technological schemes: determine product flow, control and critical points in production processes, and compliance of requirements for quality management and good safety practices;
- process monitoring: an indispensable element of the quality management system functioning in the field, product control and testing, as well as control of the processes themselves;
- product development: defines the requirements related to the creation and design of the product and the expectations of its subsequent distribution (BRC Global Standars, 2015);
- workforce training and development.

Obtaining a certificate confirming compliance with the BRC Standard for Packaging is associated with many benefits for a company. The standard is particularly focused on the safety and quality of packaging. Its requirements are based on principles of the Hazard Analysis and Critical Control Points (HACCP) and also complement the already existing management systems, including ISO 9001. The standard facilitates a company in constant observation of all activities, which enables quick correction of possible irregularities and thus increase client trust. This quality management system is also associated with benefits for business associates as standardised reports make it possible for a contractor to know exactly whether the company meets all the requirements (Malon Group, 2018).

3. Challenges arising from the coexistence of both systems

A good reputation is a key condition for the existence of modern enterprises in the market. No company will achieve a good reputation without effective

quality management that mainly aims is to build trust among customers and generate value for them through offered products or services. It is a difficult and long-lasting process because the trust gained by a producer or a service provider is built over the years through reliable and timely cooperation. Quality policy plays a key role in this process. The lack of a fair and honest quality policy that would clearly define a value for customers incapacitates trust-building efforts of a company. Therefore, a special approach to the process of developing and implementing a quality policy is required (Bacoup et al., 2018). It is important for the top management to be able to effectively convey their expectations and the adopted development vision to managers of individual organisational units. It is also important to set quality targets in consultation with the most important employees in the company and to monitor the quality processes on an ongoing basis, which plays a key role in the effective implementation of a quality policy (Molenda, 2015, p. 219).

The examination of the similarities and differences between Lean Management and a Quality Management System highlights a close relationship, which raises a key question about their potential linkage: if both a Quality Management System and Lean Management are complementary and mutually reinforcing, why are they not used as an integrated combination? There is irony in the fact that a Quality Management System and Lean are both intended to improve the production processes of the firm whereas, in reality, they are two parallel systems and governance structures driven by two different departments, resulting in wasted resources because they are not properly aligned (Bacoup et al., 2018, p. 24). The relation to the food industry makes it natural that the BRC Standard for Packaging focuses on risk analysis. Correct identification of hazards and dangers increases the likelihood of continuous, uninterrupted flow of materials. One of the obligatory system documents is technological schemes that identify the flow of materials. They represent the path of a product from raw materials to the finished result. They depict critical and control points as well as other activities characterising the specificity of a given enterprise. Well-designed diagrams identify threats (in reference to the HACCP plan) and facilitate the understanding of the relationships between individual processes taking place in an organisation as well as present the flow of materials in a graphical sequence.

Operating in highly competitive markets, modern organisations must be able to adapt in order to respond quickly to changing business conditions. Organisations operating in international markets should demonstrate flexibility and an innovative business strategy in order to remain competitive. The organisational structure can increase or hinder the company's ability to innovate. Static and hierarchical organisational structures may not provide the necessary flexibility to maintain organisational competitiveness. The key challenge is to create an organisational structure that promotes innovative employee behaviour. When organisations promote an environment conducive to innovation, employees interact more often to create new knowledge, develop their capabilities and find optimal solutions to problems (Gaspary et al., 2018, p. 2).

The former focus on automation was to increase efficiency and reduce costs. Today, global competition forces manufacturers not only to reduce costs but also to improve the quality of products and processes. Thus, the goal of implementing more modern systems has been redefined. Highly automated processes ensure high quality at a constant level. However, increasing the degree of automation also increases the chances of error. When deciding to implement production for consumer demand, particular attention should be paid to monitoring and control. Integrated process monitoring is a good method to diagnose non-optimised process conditions, followed by optimisation and feedback that is a response to the company's needs. Humanity has begun to develop automation to avoid dangerous or unpleasant manual operations and increase efficiency. Whenever possible, people implement devices and technologies replacing physical work, often using natural energy. The production pulled by consumer demand significantly improves the ergonomics of work. Manual work is gradually eliminated and replaced by integrated systems requiring gradually less human interference. Implementation of modern systems to the enterprise requires the involvement of all production processes. Its implementation is not easy, all the more so as it requires constant monitoring and control; however, achieving the goal the company will notice relatively large benefits in functioning (Voltaire et al., 2011, p. 511).

Product development and the entire sequence of activities related to its implementation are inextricably linked to continuous improvement. An enterprise that wants to exceed customer expectations improves its products or offers a new version of products. Over the years, many procedures have been formalised and described to diagnose the correct path of the com-

pany in order to properly produce a new product. Both in the scientific and industrial approach, great emphasis is placed on the conceptual phase and project plans leading to the right decision. The guidelines should contain a transparent process flow comprising four main stages – planning and clarifying tasks, conceptual design, exemplary project and detailed design (Vielhabera & Stoffels, 2014, p. 253).

4. Determination of supporting and conflicting fields

The issue of mutual coexistence of the BRC Standard for Packaging and Lean Management is systematically studied considering concrete elements of the management concepts. The BRC Standard for Packaging is considered on the level of particular requirements which should be implemented in an organisation. Lean Manufacturing is conceptualised as Five Lean Principles (Womack & Jones, 1996) and additional three types of Lean Tools and Techniques. All of them were juxtaposed, the comprehensive and in-depth analysis of all combinations was made. The identified interactions between Lean Manufacturing and the BRC Standard for Packaging are summarised in Tab. 1.

As indicated in the Tab. 1 many kinds of relationships can be found between requirement groups of the BRC Standard for Packaging and the Lean Manufacturing methodology. When the Lean methodology coexists with the BRC Standard for Packaging in an organisation, both positive and negative impacts are possible. They concern all standard requirement groups and are affected by the implementation of Lean Principles and Lean Tools & Techniques.

A "quality policy" is one of the nodal points of a standardised Quality Management System, including the BRC Standard for Packaging. The BRC Standard for Packaging states that a company has to announce a documented policy expressing its intention to produce safe and legally compliant products (BRC Standard for Packaging 1.1). The Lean methodology also has some critical philosophy which should be applied to the whole organisation. This philosophy of understanding is the value and the pursuit of perfection. The understanding of value to be coherent with the BRC Standard for Packaging should seriously take into consideration product safety. Clearly defined as well as documented formal organisational structures are inevitably required by the system (BRC Standard for Packaging 1.3). At the same time, the Lean Manufacturing emphasises the need for flexibility in adapting to changing demands of production. The focus is on value streams, not organisational functions, including cross-functional collaboration across all departments. There is a potential conflict between the BRC requirement of formal organisational structures and the Lean Principle of continuous value flow. Diagnostic Lean tools can be adopted in a structured management system to carry out the management review (BRC Standard for Packaging 1.2).

The BRC Standard for Packaging requires a serious focus on hazards and probability of their occur-

Tab. 1. Influence of Lean Manufacturing on requirements of the BRC Standard for Packaging

Chapters of the BRC Standard for Packaging	Five Lean Principles					Lean Tools & Techniques		
	Value	Value stream	Flow	Pull	Perfection	Diagnostic	In stream	Continuous improvement
Senior management commitment	N, D		C		S	D		
Hazard and risk management system		M				D		S
Product safety and quality management	N, D		C	C	N		C	C
Site standards		M					S	
Product and process control	N		C	N	C	S		
Personnel					S		S	

Legend: **empty cell** – no conflict in the coexistence, no serious negative/positive influence; **S** – supportive; **C** – conflicting, a distinctive negative influence, limitation and/or blocking may occur; **D** – can be deployed to specificity of a formalised system and support it; **M** – mutually supportive, where not only Lean supports the BRC Standard for Packaging but also the reverse influence is expected; **N** – possible negative impact and misconceptions, especially on the operational level of an organisation, mostly in understanding basic framework issues.

rence. Team collaboration, which is typical for all improvement Lean tools, appears as supportive for the risk team management according to the BRC Standard for Packaging (BRC Standard for Packaging 2.1). For risk analysis (BRC Standard for Packaging 2.2), some Lean diagnostic tools can be supportive; one of them, for example, is the mapping of the value stream (VSM). However, these tools should be mostly deployed for the specific use within the BRC Standard for Packaging. Hazard and risk analysis and management are based on existing processes, a deep understanding of the value stream seems substantially consistent.

The BRC Standard for Packaging as a management system for product quality and safety practices is building upon ISO 9001 principles; therefore, all consequences of formalisation eventually appear. Documented procedures are required directly by the BRC Standard for Packaging (3.1). The Lean approach aims to eliminate all unnecessary work and documenting records can be perceived as adding no direct value to customers. As they consume workforce effort and time, if not clearly demanded by customers, Lean treats them as *muda* (waste). Therefore, many possible conflicts may appear on the operational level within an organisation. These contact points may systematically induce inner organisational tensions.

The BRC Standard for Packaging "Site Standards" refers to the physical surroundings of a process, factory indoors, tools, equipment, etc. In this area, Lean 5S (6S) techniques seem to be totally supportive. It can noticeably support the maintenance of buildings and equipment, cleaning, pest control as well as waste management, which is the essence of this chapter (BRC Standard for Packaging, Chapter 4). At the same time, Chapter 4 requirements of the BRC Standard for Packaging are coherent with the value stream understanding (the 2nd Lean Principle). Particular requirements of the BRC Standard for Packaging are closely associated with the flow of processes.

Chapter 5 of the BRC Standard for Packaging refers to product design and process control. It is symptomatic that a large part of requirements concern inspections, measurements, testing, calibration, legality, etc. The Lean manufacturing promotes a proactive and preventive quality approach, and too many inspections are highly inadvisable. Lean avoids inspections as they represent a reactive approach that does not directly add value to customers. In Lean, it is essential to establish a smooth and continuous flow and stop the production line when a problem is detected. Inspections with related documentation and recording eventually retard the value stream flow. Corrective actions should take minimum time and keeping tact time is important for the flow efficiency. On the other hand, when it comes to product design, one Lean technique, QFD, is particularly supportive. QFD is an analytic/diagnostic Lean tool. The extensive requirements on product and process control may also be a barrier to continuous improvement. Improvement ideas generated by employees might be difficult to implement due to the standard's requirements or legal constraints. This might be a factor blocking creativity and innovation in companies.

The methodology of the Lean approach can noticeably support the fulfilment and assurance of Chapter 6 of the BRC Standard for Packaging. An experience of standardised actions can be essential in training (BRC Standard for Packaging 6.1) together with the TWI method, and personal safety (BRC Standard for Packaging 6.2) together with the 5S (6S) method. In the field of hazards to human health, strict adherence to the rules is crucial; therefore, the pursuit of excellence that is right for Lean is clearly favourable and supportive. Chapter 6 of the BRC Standard for Packaging includes many detailed restrictions at work, which need to be very closely met, such as rules for drinking and smoking, and 5S habits and culture are highly supportive.

5. Discussion

According to the conducted analysis, there are several potential negative relationships between the BRC Standard for Packaging and Lean (see „C" in Tab. 1). Most of them are connected to the third Lean Principle, related to the fast and smooth flow of value/production stream along the production system. At the same time, a relatively large number of positive relationships were identified in 12 fields (Tab. 1). It is noticeable that mostly Lean Tools & techniques have a potentially positive influence on the management system of the BRC Standard for Packaging. There is no doubt that the Lean Manufacturing can coexist with the BRC Standard for Packaging within an organisation and may enhance the formalised system of the BRC Standard for Packaging. The critical examination of both concepts encourages how the two management approaches can function together.

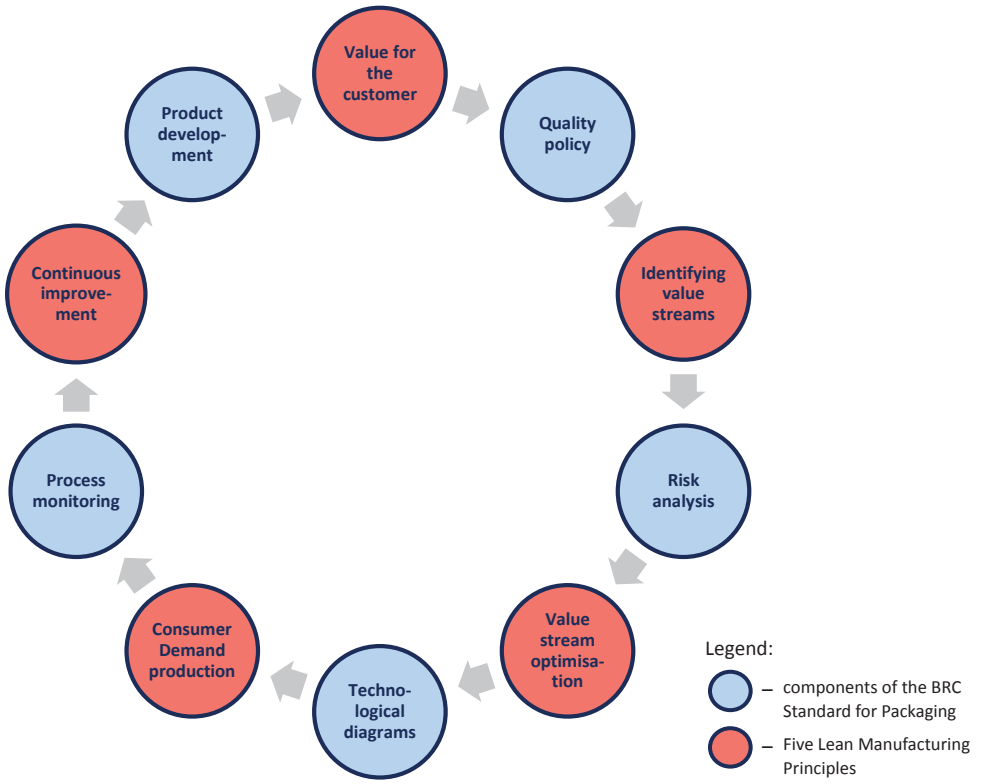

Fig. 1. Life cycle of the BRC Standard for Packaging with the Lean Manufacturing approach

Source: elaborated by the author based on (BRC Global Standards, 2015).

The Five Lean Manufacturing Principles can be successively combined with the guidelines contained in the BRC Standard for Packaging. The following schematic diagram illustrates how the different stages of both methodologies can influence one another and complement each other.

Generating customer value is a fundamental principle both in the Lean Manufacturing and in the BRC Standard for Packaging, which is why it should be included in the company's quality policy. This, in turn, should affect the value stream mapping, including risk analysis and flow continuity. Technological schemes in an enterprise should define theoretical models of processes that should be designed in such a way that the production system is consumer driven, i.e. it minimises the costs associated with storage and influences the efficiency and predictability of manufacturing processes. Process monitoring should be conscious and continuous, done in a harmonised and non-disruptive way in respect of manufacturing processes. Continuous improvement, as a routine process, should be implemented permanently in the culture and reflected in the behaviour of the enterprise. A professionally managed organisation should never block creativity and innovation of staff. Product development should receive special care from the entire organisation. Product development in the operating cycle should be inextricably linked to the creation of customer value. All processes taking place in an organisation should be systematically verified. Corrective and preventive actions should be introduced on an ongoing basis to ensure the likelihood of the proper functioning and high customer satisfaction.

Conclusions

The Five Lean Manufacturing principles can be used in the context of integration with elementary components of the BRC Standard for Packaging. The integration of both concepts is possible since they share the same goals, namely: ensuring high-quality products that create value for customers.

The article points to a synergistic platform between the quality management system of the BRC Standard for Packaging and the Five Lean Manufacturing principles. Discussing the links between these two concepts presents the main goal of the BRC Standard for Packaging, i.e., – integrating critical

processes, increasing the safety of food packaging and the successive improvement of the quality of manufactured products. However, a special role is given to Lean tools that can significantly support both the implementation and operation of the BRC Standard for Packaging in an enterprise.

The Five Lean Manufacturing Principles generate the potential for improvement of the BRC Standard for Packaging. The paper identifies the common denominators of both methodologies, whose effective implication will contribute to increasing the efficiency of a company with an integrated quality management system in the production process.

The BRC Standard for Packaging and the Lean Manufacturing approach have a lot in common. Their main goal is to improve the functioning of a company, which is why individual components of both methodologies are consistent. The managers of individual cells in enterprises should combine individual task functions in a process approach and cultivate this way of thinking among all staff. The adaptation of preventive actions, having their sources in both concepts, increases the probability of proper processes related to the continuous improvement of the whole organisation.

The analytical and conceptual work carried out on the integration of both approaches is important, because these issues are vital to companies operating in the packaging production sector. This work consists of the rapid and effective improvement of operational efficiency and competitiveness. Further research is needed on how to solve the issues raised in this article, first of all regarding the negative impact on the Quality Management System. It should be emphasised that both the Lean Manufacturing and the BRC Standard for Packaging can be subject to adjustments. The areas identified as supporting the BRC Standard for Packaging, or supporting each other, require the development of many practical details for coexistence. It is a very important topic, which should be the subject of further research. This study is an introductory discussion on the vivid managerial issue of the smooth and mutually beneficial coexistence of the Lean Manufacturing methodology and formalised systems, such as the BRC Standard for Packaging.

Literature

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