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TIME-BASED COMPETITION IN THE SUPPLY-CHAIN: THE ROLE OF THE LOGISTICS SERVICE PROVIDERS

Review Article

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Abstract

Among the service industries, the analysis logistics as an academic field which has a great influence on firms' creation of value and competitiveness, and within this the analysis of firms providing logistics services (3PLP), has become more relevant than in previous years. Among the expectations of logistics service providers, and among the sources of competitive advantage, are timeliness and flexibility, which can only be handled and measured together, because of the integration of services. At the same time, when supply chains (not corporations) compete with each other, we must create the opportunity to manage chains beyond company boundaries. Our aim is to investigate the time-related problems of supply chains (and sections) and logistics service providers, and their consequences and solutions. We have found that the development of time factors which appear and can be measured in the realization of logistics services contributes to the competitiveness of a logistics service company. The performance provided by companies that are integrated into the supply chain's member companies and operate as flexible logistics service providers can have a significant impact on the (full) operation and efficiency of the supply chain.

INTRODUCTION

In recent years it has become increasingly topical to examine logistics as a field of science that significantly influences the value creation and competitiveness of enterprises, and more specifically to understand and analyse the activity of enterprises providing logistics services. Fast changing market environments and fluctuating customer demands require the efficient operation of logistical processes (Kovács & Kot, 2016). In recent years, globalization processes have accelerated and the uncertainty about how markets will evolve has made it increasingly important for companies to be aware of the supply chains they participate in and to understand the roles that they play (Kot, 2014). By taking the voice of the customer (VOC) into consideration the constantly developing and transforming logistics enterprises have established a widening service portfolio (Zaltman & Coulter, 1995; Gaskin et al., 2010).

Companies outsource their logistics functions to third party logistics service providers (LSP) in order to concentrate on their core business activities. A LSP is an independent enterprise which does not own the product(s) or service(s) but participates in the supply chain and provides logistics services under a contract to the manufacturer, retailer(s) and/or consumers of a product or service (Giri & Sarker, 2017). This advanced customer management approach determines not only the versatility of the service portfolio of LSPs (Murphy & Daley, 2001; Markides & Holweg, 2006), but also their complexity, which – in addition to their age and their position in the life cycle of an LSP enterprise – has a significant impact on the size, development level and degree of success of these enterprises. Historically, LSPs provided traditional logistics services, such as transportation and warehouse management. However, the increased volume and scope of services demanded from LSPs have brought about a change in their role, so that today they are engaged in strategic coordination of their customers' supply chain activities (Zackaria et al., 2011). A more advanced role for providers has been created by the connectivity and communication requirements of leading supply chains.

These companies have evolved from providing logistics capabilities to becoming orchestrators of supply chains that create and sustain a competitive advantage. The literature shows that the 3PL industry is an increasingly important topic for researchers (Maloni & Carter, 2006; Yeung et al., 2006; Selviaridis & Spring, 2007; Trentin, 2011; Marchet et al. 2016; Mehmann & Teuteberg, 2016). The most frequent references to the topic since the 1990s have mostly been American and British, but researchers from North European countries such as Sweden and Norway have also been publishing their scientific findings related to the sector since the turn of millennium (Murphy & Daley, 2001; Hertz & Alfredsson, 2003; Huemer, 2012; Markides & Holweg, 2006).

For companies carrying out logistical services, "international supply chains pose challenges and opportunities at the same time" (Markides & Holweg, 2006). The competitiveness of supply chains is determined by the quality of customer service, which is in turn determined by two factors: coordination and integration (Stadtler & Kilger, 2008). Identifying these challenges and exploiting future opportunities will be an important task for logistics service companies. The organization and implementation of the supply of goods between supply chain members should be organized in such a way that economies of scale (cost-effective methods which bridge large geographical distances) and economies of choice (customised services offered) apply simultaneously to chain members (Bowen & Leinbach, 2004). Since the management of links between supply chain members is carried out by logistics service providers and their importance and role have been strengthened recently, the comprehensive, scientific examination of logistics service providers is current and necessary.

Due to the role of time and growing customer expectations, it is not the goods and services of companies which compete for orders from old and new customers; today competition has developed between supply chains and networks.

Today, time is the cutting edge. The ways leading companies manage time - in production, in the development and introduction of new products, and in sales and distribution - represent the most powerful new sources of competitive advantage (Stalk, 1988; Vesey, 1991, Handfield & Pannesi, 1995, Kessler & Chakrabarti, 1996; Lederer, 1997). Time, as a measure, has been established as being strategically significant for contemporary business. The scale of time compression that is possible in most businesses is very significant, because non-value-added time in most processes accounts for at least 95 per cent. The impact of commercial advantage is accompanied by reduced levels of commercial risk (Beesley, 2010).

The timeliness of the topic is enhanced by the fact that while time-based needs have come to the forefront of customer expectations, there is a lack of theoretical work to comprehensively examine the time-related problems experienced by logistics service providers, and their consequences and possible solutions.

LITERATURE REVIEW

Time-based competition and its development and appearance in the life of firms

In the production and/or provision of services in developed countries it has been a basic requirement since the 1900's that the specific production costs per product and/or service be as low as possible. This approach received greater emphasis following World War II, and cost-based competition between companies became typical. In the '50s, in addition to managing costs, inventory management became increasingly important. With the advance of economies of scale, the marketing concept continued, leading to the focus on consumer demand (Szegedi, 2012). The '70s and '80s emphasized the demand for high quality and individual production and the benefits of customized services. During the Quality Based Competition period, there was a strong emphasis on the development of product and/or process quality (Kalló, 2010).

Since the 1990s, competition between companies has been intensified by the role of time. As a result of accelerating technological development, the significance of time factors has increased (Kalló, 2010, Chikán & Demeter, 2001, Chikán, 2003) and therefore the leading companies have started to differentiate themselves from their competitors in terms of cost-quality and timeliness.

To increase market share, companies pay close attention to retaining existing buyers and luring new buyers. According to Stalk (1988), steps towards market expansion dominate consumer demand and expectations, so high quality customer service has been given priority over the past few years. Consequently, competition between companies has been intensifying in order to increase sales figures and performance indicators. Globalizing markets will further strengthen this process, and the competitive situation will continue to intensify in the future. The main reason for this is the growing penetration of multinational corporations, the internationalization of production, cross-border outsourcing and the servitization of manufacturing companies (Demeter & Szász, 2012).

A more recent framework identifies two key dimensions that differentiate outsourcing engagements (Sanders et al. 2007). The first is the scope of the outsourcing engagement and the second is the criticality of tasks outsourced (Li et al, 2014). Scope can be defined as the breadth or degree of responsibility assigned to the 3PL (Zacharia, 2011). Business organisations require the services of this company in order to outsource part or all of their supply chain operations to reduce the burden of logistics activities and achieve customer satisfaction and overall performance (Giri & Sarker, 2017).

The result of the processes described is that the internationalization of production will continue to be more intense, affecting the evolution and the change of supply chains and the shifting of the products manufactured by production companies in a service direction.

Price and timely delivery are two important factors for success for service providers in today's competitive markets, and many service companies are offering time guarantees to compete in a time-sensitive market (So, 2000).

In a modern competitive environment, time can be studied in two different aspects. One concerns products and services produced by businesses, and one analyzes the time factors needed to carry out the core business tasks. Based on this, two time characteristics can be distinguished: external factors directly perceived by customers and factors only indirectly perceived by buyers (De Toni & Meneghetti, 2000). The properties of time characteristics are summarized in Table 1.

Table 1 illustrates the fact that supply chain management has an impact on both external and internal time factors, and therefore can play a decisive role in the competitiveness of time-based companies. As logistics service providers manage processes (material, information and document flows) between members of the supply chain, indirectly the expected, timely performance of the services provided by the logistic service providers (whether it is internal or external) also affects the competitiveness of production and manufacturing companies. Among customer expectations, of course, low price and high quality as basic requirements have remained, but time, understood as the availability of the product and/or service has, in recent years become much more valued, and still retains its significance.

The market situation was characterized by confusion and uncertainty at the turn of the millennium. Market turbulence has grown and demand is more volatile in almost all industries than it was in the past (Christopher, 2000). Christopher et al. clearly describe the market environment of the early 2000s and the acceleration of customer expectations. Only a company whose responsiveness to change is high can give appropriate answers to the challenges of a constantly changing environment.

The expansion of global companies, the tendency for major companies to merge, and the spread of the Internet further fuel the emphasis on time-related expectations. The rapid spread of the Internet has reinforced novel solutions of e-commerce and the fact that they have become favoured approaches. E-commerce is typically divided into two branches: Business to Customers (B2C), and Business to Business (B2B) trading (Talyigás & Boda, 2002).

However, the vulnerability of supply chains has increased in recent years. This is not only due to external events, such as natural disasters, but also to changes in business strategies (Christopher & Lee, 2004). The global crisis which has been present since 2008 has further amplified the customer's

expectations regarding time. In addition to the negative effects of the crisis, the effects of other natural disasters (the tsunami in Thailand, the Japanese nuclear catastrophe in Fukushima, volcanic clouds, etc.) have also forced market participants to confront the fact that transit times caused by long distances are significant risks, and as a consequence, several large companies have decided to return their production from the Far East to the US and/or Europe. The most widespread practice in the period prior to these disasters was that low-value and repetitive production processes were primarily deployed to developing and/or remote countries, and high-value-added activities close to the final consumer in the supply chain (Mudambi, 2008).

The economic crisis has strengthened not only the expectations of customers regarding time, but also their expectations regarding the quality and the demands of the relationships between companies. The growing levels of trust in the supplier networks, the developed and ever-strengthening cooperation between partners, their pro-active approach to demand and their ability to predict have – as expectations on the part of suppliers - all become important factors affecting their intention to remain in the market. However, expectations over time will continue to be among the key requirements of business relationships. The question will be primarily when the product and/or service will be available to the customer, when it is completed, and when it can be consumed by the final customer or consumer.

Continuing from the above, we can conclude that in selecting products and services, the product and/or service availability and the lead time between the order and the delivery play an increasingly important role in the price and quality of the product. Lead time is the interval between placing an order and receiving it. As a result, delivery lead time, in addition to price, has become a dominant factor in determining a firm's competitive advantage. That is to say, delivery lead time is not only becoming the order winner, but also the order qualifier (Shang and Liu, 2011). On the other hand, to achieve a shorter lead time, the manufacturer may increase its investment in reducing lead-time, thereby incurring a higher operating cost (De Treville, 2004; Leng & Parlar, 2009). The lead time issue discussed above is critical in most companies, because long and uncertain lead times can lead to many disruptions in supply chain performance (Schmenner, 2001; Heydari et al, 2016).

The time-related requirements of customers have a significant impact on the sales of manufacturing and service companies and also on the relationships between firms, as well as on the competitiveness of the suppliers. A supplier who is able to meet delivery deadlines (within a certain tolerance) will always have an advantage over its competitors.

In their everyday lives, consumers can opt to choose another product and/or service without thinking, if they cannot immediately get the product and/or service they want (even if the new choice is more expensive). This is also supported by Földesi's (2006) research, which says that if the supplier is able to keep promises, the random effects influencing customers' activities will be significantly reduced. Time-related expectations brings a shortening of product life cycles and an acceleration in technical obsolescence: the product and technology curves have been significantly shortened and demand along the life cycle curve is difficult to predict due to competitive product launches (Christopher & Lee, 2004). As product life cycles are shortened and global economic and competition forces create further uncertainties, volatility is becoming increasingly typical in markets (Christopher, 2000). These expectations and tendencies have a significant impact on customers and on logistics service providers and on relationships between companies. In the competition among products and services, the higher value given to time has defined the approach to competition and to supply chains. Due to the role of time and growing customer expectations, today it is not companies and their products which compete for orders from old and new customers; competition now occurs among supply chains and networks. For international logistics companies, international supply chains pose challenges and opportunities at the same time (Markides & Holweg, 2006).

The competitiveness of supply chains is determined by the quality of customer service, which is characterized by two defining factors - coordination and integration (Stadtler-Kilger, 2008). Identifying these challenges and exploiting future opportunities will be an important task for domestic logistics service companies (3PLP).

Continuing this, we can conclude that guaranteed delivery times allow buyers to keep stock at a minimum, eliminate shortages of goods, ensure continuity of production, and simplify order placement (Földesi, 2006).

THE EFFECT OF TIME PERFORMANCE ON LOGISTICS SERVICE PROVIDERS AND THE SUPPLY CHAIN

When analyzing the characteristics of the new strategies which support the global market and time-based competition it is higher quality, lower costs and a slimmer organization which have to be achieved and established. In the case of newly developed products, these features include the use of new technology by competitors, filling new market gaps ahead of competitors, greater customer satisfaction, and better integration of the entire company (Ceglarek et al., 2004).

Global logistics service providers which support a chain of supply companies in company networks, represent significant added value for supply chain members. The information and documentation material of the entire process is concentrated in one pair of hands, which allows process information to be accelerated, to be utilized more efficiently and not to be lost. Global companies operate increasingly complex and comprehensive networks, so they can only be served by logistics service providers who can globally support the entire supply network organically and within a service portfolio (Szegedi, 2012).

In order to judge the role of logistics service providers, it is best to start from the fact that the lead time and costs of raw materials and semi-finished products both within and between companies play a key role in company profits and in increasing customer service levels. Reducing the lead times and costs of raw materials and semi-finished products has been a key factor in managers' decisions in recent years. On the basis of the system approach we can conclude that it is necessary to reduce the stocking time and the cost not only of a producer or a sales company, but also the entire supply and distribution channel. Logistic companies involved in the supply chain play a significant role in reducing inventory costs (storage, inventory, administration, etc.) as well as reducing lead times.

We face the dilemma of finding the best compromise between the above demands for cost reductions and lead times when we examine the solutions of the business sector in 2017. According to expert estimates, 20% of the goods released are currently in the logistic systems that cross the world, and the products are temporarily stored on some means of transport at this moment. The acceleration of this temporary storage is a business interest of the manufacturing and manufacturing companies, and has recently been the subject of several solutions, such as the "New Silk Road" project linking China with Europe, with which railroad developments and traffic have been initiated. The goods dispatched in this traffic reach Europe within two weeks, while shipping vessels on seagoing ships still need at least 25 to 30 days to reach the coasts of Europe.

In this respect, the two transport subsectors have become competitors, as a consequence of which the freight rates of goods transported by sea (a significant part of customers' transit costs) have shown a tendency to decrease, due to growing maritime capacity and due to the appearance of, and the prices offered by, the competitor. This can be called a logistic "trade-off", where time and cost are on both sides of the balance sheet, as the faster rail solution competes with higher prices for a slower, but more favorably priced sea offer. Customers are a faced with the paradox of computing and choosing between time requirements, costs, and freight rates.

Compliance with changing customer demands has resulted in a changed competitive environment for companies, and this process is increasingly challenging for logistics service providers. The success of logistics service companies is significantly influenced by the time parameters of the services they provide. Stenbacka (1995) found that the time needed to receive the service determines the level of service. Accepting this, we can conclude that the development of the time factors which appear and can be measured in the realization of logistics services contributes to the competitiveness of the logistics service company.

An examination of the time dimension of the supply chain is facilitated if we know what kind of approach is generally taken to time by organizations, and in their mutual relationships. One option is to use time as an action frame, where time-based and/or time-demand approaches become the focus. Another option is to handle time in an active way, i.e. taking into account the scarcity of the use of time, and to use time as a target (Süle, 2014).

In the context of the supply chain, we can conclude from the above-mentioned literature that in today's challenging economic environment, time-based competition requires a reduction of lead times at all levels of the supply chain. This is also confirmed by Christopher (2000): the risk associated with long and slow moving logistics processes has become untenable, forcing organizations to review the structure and management of their supply chains. The importance of the role and significance of time and the monitoring of time performance is also noted by Süle (2014), who states that time performances add up within the company and along the supply chain, so that generally reductions in time taken and work time downsizing have become the primary goal among managers.

Christopher (2000) emphasizes that due to the changed economic circumstances, chances for survival lie in reactivity and agility, and these are particularly important for creating supply chains capable of reacting quickly. Conversely, inserted elements have a delayed effect that negatively affects reaction times (Süle, 2014).

One of the biggest risks to managing supply chains from the service side is the cost increase caused by waiting times. The phenomena caused by waiting times (delays, inventory growth, safe storage of stock, etc.) significantly undermine not only the quality of the service provided by the service provider and the profitability of the companies in the chain but also ultimately customer satisfaction. In the solutions provided by logistics service providers, the management of service companies strives to offer the best alternatives to reduce temporary waiting times for their partners. This is implemented in practice through two concepts: one is influencing demand (foresight, planning, alternatives, communication with clients, IT connections), and

the other is compliance with the flexible modification of available capacities.
Lai et al. (2008) propose that the level of information technology capability significantly affects the competitive advantage of a 3PL provider by reducing costs, and supporting innovation and service quality. The results of Davis et al., (2002) indicated a significant, positive relationship of a market differentiation strategy to SIT to cycle time to performance.
Among the factors determining the customer's perception of the performance, Evans (1991) mentions the cost, quality, reliability and timeliness of the service. Ramanathan's (2010) research, using data from online evaluations of customers served by logistics companies, studied the relationship between logistical performance and customer loyalty. The results showed that while the role of the services provided by the logistics service provider (mainly thanks to the services developed for time requirements) has a significant impact on the efficiency of customer service, there is as yet no great risk that logistical performance will affect customer loyalty.
Thus, among the customers' expectations, time-related demands, and within this a high degree of flexibility of the logistics service provider, are becoming increasingly important (Anderson et al., 2011). A logistics service provider who performs an accurate, timely delivery and deals flexibly with the buyer in, for example, orders and time requirements, can develop a competitive advantage and increase its profitability.
The figure 1 shows how different functional logistics and their interconnections make the timing parameter important. Logistics can also be linked to time on functional bases, by distinguishing purchasing, production, sales and inverse logistics, each of which calls into question the length, any eventual periodicity, and the timing of each process, as well as the timing of each event, the sequence followed, the synchronization and the tempo. The process-based analysis method makes it possible to design, execute, and evaluate time and time performance from an operational point of view. The development of lead times as time performance determines the quality of customer service and, on this basis, its external evaluation - customer satisfaction. The sum of time performances accumulates within the logistics provider and along the chain, so usually the goal is to reduce them and eliminating downtime (Stalk, 1998). Additionally, adjustments have to be made to deal with the effect of delays, which negatively affect reaction times. The result-centric approach also examines the external time performance that customers can see. This is the service side where time-sensitive aspects of performance, such as speed or precision, can be seen as a quality factor affecting customer satisfaction (De Toni-Meneghetti, 2000). Time-based quality elements can be interpreted as lead times, but in this case it is the result which is of interest. Objective and subjective evaluation also appears, depending on whether internal or external performance is measured, i.e. time performance is measured from the supplier or customer side (Süle, 2014).
As a summary, it can be said that the time factor-related performance delivered by the provider will affect the efficiency of the entire supply chain, as well. This observation leads to a consideration of the concept of flexibility.

THE CONCEPT OF FLEXIBILITY AND ITS OCCURRENCE

Three of the definitions of flexibility are highlighted - the first two of which are dealt with comprehensively and comparatively, while the third focuses on the field of expertise – and the concepts behind them are explained. Within flexibility, the concept of "dimensions" is based on the work of Evans (1991), which interprets flexibility initially in two dimensions: in terms of time and intention. By expanding this framework, his research work interprets the four dimensions of flexibility from the literature he has studied. These are the following:
1. Timeliness (time flexibility): how long does it take for an organization to adapt?
2. Range: How many options can an organization choose from so that it can react to both predictable and unforeseen changes.
3. Intention: is the organisation proactive or reactive (at the leading edge of change or just reacting to changes)?
4. Focus: whether the organisation gains flexibility through intra-corporate processes or through external relationships with trading partners.
Flexibility measurement recommends the following metrics: efficiency, the ability to respond (reactivity), how it responds to change, and the ability to respond successfully to unforeseen consequences (Evans, 1991).
Golden & Powell (2000) has defined flexibility as the ability to adapt on four dimensions: time, choice, goals, and focus. In addition, a recommendation was made to measure flexibility, which can be achieved using its own methods of measurement, i.e. efficiency, reactivity, diversity and robustness. A similar definition and category appears in de Haan et al.'s research (2011), where adaptability is dealt with as an element of flexibility, and it is pointed out that general practice also uses adaptiveness as a synonym for flexibility. Returning to the logistics service companies which are the focus of our survey, we can say that companies that operate as integrated and flexible logistical service providers in the supply chain are able to have a significant impact on the (full) operation and efficiency of that chain. To add

further precision to this idea, the flexibility of the supply chain is the ability of the company to respond to customer expectations and unexpected changes in the activities of competitors (Moon et al., 2012).
A similar approach is also presented in Wimmer's (2002) workshop study, which describes flexibility as a source of competitive advantage. Flexibility as a source of competitive advantage shows how well the company can adapt to changing needs (new product or product variants, delivery capability, quantitative changes) and changes in inputs (e.g. quality of materials, composition of resources). The system of performance indicators that it compiles includes both time and flexibility as sources of competitive advantage (Table 2).
Indicators related to time as a source of competitive advantage can include measurements of the time of order fulfillment, of production and the time needed for completion of delivery, but the exact delivery time and delivery frequency can also be an important factors in competition.

CONCLUSIONS

As a summary, it can be said that - thanks to the integration of services - among the expectations logistics service providers are expected to meet, and among the sources of competitive advantage, time and flexibility can only be managed and measured together, and the performance associated with these factors will have an impact on the efficiency of the entire supply chain, as well. At the same time, when supply chains (not companies) compete with each other, we must create the opportunity to manage chains across a company boundary. All this requires a serious IT background and the capability to cooperate on IT issues.
One of the most critical drivers of supply chain success is enchanced visibility through information sharing mechanisms linking supply chain partners. Considering the significant role of IT in supply chain succees, IT-driven models are in high demand (Min & Zhou, 2002).
Functional areas of logistics can also be linked with time, and for each area questions are raised concerning the length, the eventual periodicity of each area's activities, and the timing, ordering, synchronization, and tempo of individual events. When the viability of supply chains is increased and when logistics service providers undertake to provide supply chain management services, by accelerating the processes and by increasing their agility, providers can - covering the whole value chain and supporting it – affect both total cost reductions and, though this, customer service standards. Time-related research is becoming more and more important, as there is a need to strike a balance between rising time expectations and their sustainable fulfillment.

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ANNEXES

Table 1 Internal and external time characteristics of individual firm processes

	Internal time characteristics	**External time characteristics**
Product development	Time to market	Frequency of new product launches – new products – development of existing products
Acquisition, production, distribution	Process time – acquisition – production – distribution	Delivery time – speed – accuracy

Source: De Toni & Meneghetti (2000); authors' own editing

Table 2 The systemisation of performance indicators

The systemisation of performance indicators		
What are we measuring?	***Sources of competitive advantage***	*price*
		quality
		time
		flexibility
		reliability
	Stages of the process	*input*
		transformation (process)
		output (result)
	External or internal efficiency	*profitability*
		efficiency

Source: Authors' own editing, based on Wimmer (2002)

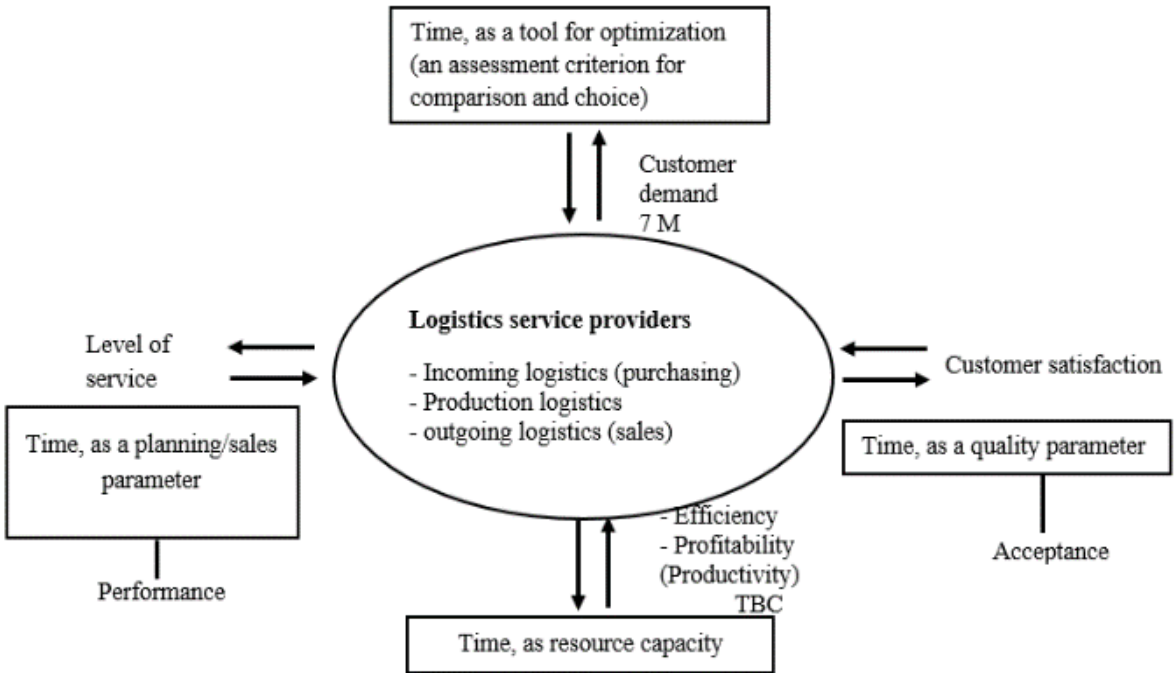

Figure 1 The role of the time factor from the operation and service side
Source: Süle (2014)