

The role of time factor in marketing-logistics

EDIT SÜLE

*Lecturer, Széchenyi István University, Kautz Gyula Faculty, Marketing and Management
Department, Győr, Hungary*

PhD-student, Multidisciplinary Social Sciences Doctoral School, Győr, Hungary
sedit@sze.hu

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Abstract 'My question is: why do we keep accounts?
Is not it mainly for the purpose of controlling ourselves,
not to waste money? If the fact is proved to be true already now that
time is of a greater value than silver, gold or diamond, why do
not we keep accounts of time in order to manage time better?'
(Admonitions by István Széchenyi, 1857)

Summary: Time necessary to obtain a product/service (access time) is involved in product utility to an increasing extent, the assurance of which is the task of logistics. There are more reasons for the shortening of this access-time the most important source of it is the change in customer expectation, which can be related to new trends emerging in the most diverse areas with the time factor playing the main role. Increasing rapidity is also encouraged by the sellers in the competition against each other based on time, the advantages of which are taken by the customers as well. However, through the Kano-model we can trace the phenomena of the customer evaluation of the obtained services – which shows a decreasing tendency as time goes by – and that of the sellers' pressure to assure higher and higher quality – externally influencing the customer to expect higher and higher quality. This way time value can be traced back to endogenous and exogenous variables which are rooted in the most important expectations for logistics along the temporal dimension. The first part of the study is intended to outline the framework of the changing view on time, the second part wishes to take account of variable solutions based on time, and the third part deals with such results, that came from important secondary, and from my own primary researches.

Keywords

Logistics, CEP segment, time performance, time sensitivity, time based competition

1. Introduction

The 21st century is referred to as the age of the informational society¹, in which several things work in a different way from the ones we got used to for a longer period (Z. Karvalics, 2002).

¹ From the many definitions we quote here only two which explain the term from our topic's point of view. 1. A new type of society in which humans have a possibility for a new type of lifestyle, higher quality of life, working and social role with help of the global spread of informational and telecommunication technologies (Murányi, 1977). 2. Informational society is an economical reality and not only theoretical reference... the spreading delay of information disappears... new activities, procedures and products appear gradually (Naisbitt, 1982).

The mainstream causing the changes is the change in the attitude towards time (Castells, 2005) (Hámori-Szabó, 2006) (Töröcsik, 2007), the signs of which are to be perceived in the fields of culture, lifestyle, customer needs, consumption, customer behaviour (Töröcsik, 2003). The change in the attitude towards time can also be seen in the economy, where competition has been placed to a new field.

After recognising the character of time as a resource a competition based on time has begun among the actors with the spread of new management technologies being aimed at decreasing time consumption and faster service. Through these they are intended to achieve traditional purposes such as cost reduction, capacity utilization, increase in efficiency, quality improvement, customer satisfaction (Stalk, 1992).

Logistics is the field which is known to represent the largest portion of the time necessary to become an end product. This time consumption is partly filled by the waiting period between each working processes (inventory and stock management), the other part is filled by movement among different locations (delivery, material handling). From another aspect the actors participating in production are connected by logistics as well, where the time of reaching the different connecting points is of high importance so requirements for logistics have formed at these spots - they can also be defined by time parameters, and their fulfilment can be measured without any difficulties.

The true phenomenon of the faster being the more expensive at the same time can also be traced in freight services, while being cheap remains a central question. The connection mentioned above, however, ignores the hidden costs of time triggered at the customer's side by waiting, unpunctuality, delay (Süle, 2007). So behind time there are hidden costs the calculation of which has not been solved today, however, companies tend to deal with them more and more often, rather by instinct. Measurement and consideration of parameters based on time enables an optimization based on time instead of costs, in which the dilemma of the trade-off between being fast and cheap at the same time can be resolved.

By reviewing the literature the present study first takes a closer look at the social fields where changes in the time attitude can be traced then it will identify trends prevailing in social and economical behaviour in the long term.

The second part intends to deal with effects of the competition based on time, and, with the different responses given to the increasing need for being fast, while it also wishes to find out their reasons. The third part is concerned with the logistical performances measured by time, within those connected to transportation in the first place.

2. Accelerating time

This part of the study deals with diachronic time that is how time was conceived, measured, and changed through history. Time brings an exceptionally wide variety of topics, from calendars and clocks to trade and telecommunications. The goal of this chapter is to briefly demonstrate how the time awareness changed in various societies depends on varying historical and geographic impacts. Every society develops different way of dealing with and perceiving it. Different social formation gave time widely variable meanings and every set of understandings proved to be temporary.

There is an acceleration of the rhythm of life. This aspect refers to the temporal compression of our daily actions. The quantity of actions contained in a lapse of time tends to increase. While the range of possibilities of action grows and expands its horizons, the temporal pressure weakens its quality. In more general terms the tension between interior rhythms and social rhythms is the distinctive sign of this form of acceleration (Warf, 2008). Therefore, the time-sensitive segment of population continuously increases.

The pace of progress has become faster than the alternation of generations. An example of this is provided by the duplication of the scientific activity every ten year, as a result, 90 % of all the scientists having lived in history is living and working now (Marx, 2006). By this time the world has accelerated even more, a clock serves as a good illustration of this: if we wanted to depict the 4-5 million years of human history than human civilisation would be crammed into the last 3-4 minutes. Life cycles shorten, mainly in the field of technology. At present the Moore-law is often cited (Doyle, 2002), marking the time necessary for computer performance to duplicate as 18 months, furthermore, we can also find an example of extreme shortening of life cycles in the car industry, where the acceleration of the pace of development time is the most striking.

2.1. Changing time-awareness

Defining time is a rather complicated and difficult thing. The problems in connection with time were already discussed by St Augustine more than 1500 years ago. Since the time of St Augustine we have not been able to get much closer to the notion of time, we do not know if it has an end or beginning, however several other aspects are already known. In the field of physics, great progress has been made concerning the nature of time and its measurement. The laws of time-based physics by Max Planck and Einstein have changed our world view. Accordingly, there is no time without space. This thesis was published and interpreted in an understandable way by Hawking.

Time is a *relative* thing; its perception depends on the relative situation of the observer in space: hence time can be faster or slower. However in the age of Newton time was conceived as *absolute* phenomena. Time is a social symbol for manage our life according to phylosophists.

The subjective experience of the objective flow of time can be possible only if something happens. In other words, experiencing time can be done only by experiencing events. No time without space. The subjective experience of time depends on our activity. This means, that there is an objective time is perceived subjective way. So time is *objective* and *subjective*, that is it exists as abstract entity that seems to take on lives of their own, and simultaneously as lived experiences highly meaningful to the people who create and change them. The study of time is therefore much more than an abstract academic exercise but how societies are structured and change and how people live within it (Rosa, 2003). During the earlier time the notion of the individual existing simultaneously within two forms of time – *diachronic* (linear, sequential) time - it is an empirical time and *synchronic* time.

In practice, time units can be used properly without knowing etalons (etalon is a measurement instrument that embodies the measurement unit of a certain amount in a reproductive way) for most phenomena. Usually events or processes are connected to points or periods of time (their results can be categorized by time-state sequences or time-period sequences).

Measurement units of time and clocks give the opportunity to measure time. For measuring, sequence of events can be used. With the development of astronomy and calendar-making, shorter and longer units than a day appeared along with separate number-systems as a consequence of the 365-day-long year (number-systems of 12 and 60). The first scientifically established unit of time has been the second (now SI unit), which was defined in 1820 as one over eighty-six thousand four hundred ($1/86400$) of the medium Solaris day (Solaris day is the time passed by between the two successive culminations of the Sun). With the development of atom physics, in 1967 a more exact definition was given for the length of a second. The atom-clocks – the most punctual constructions at present – still operate according to it. The actual definition is as follows: the time period of 9 192 631 770 periods of the radiation between two hyper energy-levels of the basic-state cesium-133 atom.

Our age is not by accident referred to as a digital age, namely this possibility of handling information is covering more and more fields, enabling the so-called real-time mode², so the succession of question and answer without breaks. This way you can get the same amount of information within less time, or you can get a greater amount of more accurate and more up-to-date information (e.g. online information, network news services) within the same amount of time.

The technological advance enables us to use telematical devices, data transmission modes and infrastructure based on these which can bridge the spatial and temporal gaps. With the help of these the processes taking place in remote locations can be connected and accelerated, the development of transport infrastructure (although limits of capacity can hinder this) enables constraints of space more and more to remove and the significance of location to decrease (Porter, 2006).

We can say that information technologies create a new kind of spatial- and temporal structures by reshaping their use. The ability to change time and space also enables one to handle them not as obstacles or set conditions but as flexible frames and also to combine them.

² The definition is included in the FOLDOC (Free Online Dictionary of Computing)

Bridging the spatial gap can be achieved only through time sacrifices but the amount of this is declining by the increase of speed. In certain cases, when locomotion is a necessary condition for an activity into another direction, information technology can completely replace the transport to this direction (online meeting, video conference, distance learning, home office, online shopping, telebanking, etc.). Information may also replace goods handling and inventory. Spatial and temporal boundaries are becoming relative, acceleration is diminishing economical space, however, the 'radius of action' is extending. These are the two different sides of the same phenomenon, so considerably less time (diminishing) is necessary to complete things and more things can be completed within the same amount of time (extension), respectively. In the context of time and space it means that the same distance can be covered in a shorter period of time and you can get further within the same time. This relationship can be depicted, the ways of it will be shown by the next subchapter.

2.1. Time maps

Since aspects of movement other than optimisation based on time have emerged (optimisation based on time and cost) solutions are highlighted which concentrate on how to cover spatial distances in the shortest possible time with the lowest possible costs instead of getting somewhere in the shortest way. Thus between two geographical points not only a geographical space can be depicted but a time space as well based on the time necessary to cover the distance between the two points and perhaps a cost space can also be depicted based on the costs necessary to cover the distance. The time space of the real-time telecommunication is concentrating at one point. The cost space of this, however, cannot be regarded one point (Dusek-Szalkai, 2007).

There are two basic solutions for depicting time spaces (here we will not deal with introducing space informatics solutions in which optimisation based on time also included). The first one is the group of izochron maps keeping the traditional geographical distances and depicts the points which can be reached – from a determined place – within the same time with help of izolines. In the other group the distances depicted are proportional not to geographical distances but to the time necessary to reach them. Two points will be closely connected if it takes a short time to connect them, and the points which can be reached in a longer period of time will get farther from each other.

On the izochron maps it can be seen very well that spaces expand where transport infrastructure is developing (motorways) and shrinking can be experienced where the transport conditions are poor (overcrowded roads and sparse transport network, etc.). From the maps showing time distances you can read the consequences of the changes in transport conditions. On these maps the same effects are quite the opposite.

2.2. Time scales

Besides managing material goods (money) and energy (health), the third factor one may and has to manage is time. The calendar frames of time management are embodied by calendar cycles (daily, weekly, seasonal, annual). The real frames of time management, however, are equally influenced by permanent and temporary elements. Our days are mainly organised along the lines of regular tasks (working, studying, looking after each other). Moreover, we also have to meet our biological needs (sleeping, eating, drinking) and other additional activities also take time (putting on clothes, washing yourself, etc.). The way how to manage these are generally determined by the factors concerning everybody (employees) in the same manner - they are usually compulsory (working hours, holiday, retirement age, etc.) – and by the effects originating from the structure of population (age, life period, schooling, employment group, household structure, additional income pressure), which influence the structure of time consumption only for a shorter or longer period of time. These effects mentioned latest are the ones causing social differences in the extent of time available, in the time management and in the evaluation of time and in the attitude towards time. It can be seen that among the factors influencing rhythm of life there are some elements you are forced to do and some others depending on our own decision.

At present it is common to refer to a universal trend prevailing in Europe and in Hungary as well that the time spent on working is continuously decreasing. The same phenomenon from another side is encountered when talking about the increasing amount of leisure time. However, if we look around, we do not see this but it is not contradictory.

If we look at the statistics taking account of the different time consumptions - time scales³ – the decrease proves to be true regarding the whole society, however, our time management is shaped depending on demographic, employment and cultural characteristics, and it is also affected by the trend of the economy beyond the actual development of it. What also matters apart from these is the index (A, B, C) of data collection from which we draw the conclusion.

The data transmission indicating time consumption of a population has an extensive international practice with the average daily time consumption in the centre. The first known survey of this type was conducted in 1920. In Hungary these surveys are made repeatedly since 1963 approximately every ten years, from the results of which the changes in the economy, in the society and in the structure of population can be traced. We can see that there are huge differences between different eras and nationalities. Today an analysing framework also exists being able to connect time scales to spatial dimension, thus social activities can be analysed within the framework of a temporal-spatial scales (Nemes Nagy, 1998). This framework is time geography, the starting point of which is the survey of the individual's movement in time and space.

A, B and C type of indexes can be identified within the data from the time scales, of which

- Index 'A' studies average time input for the whole population surveyed, independently from the fact whether the given activity has been carried out by someone or not (with help of this the structure of the daily time consumption can be surveyed, so the ratio of the individual activities in a day and the ratio of these activities compared to each other, respectively)
- Index 'B' indicates the ratio of the humans carrying out the activity, the frequency of carrying out the activity
- Index 'C' informs us about the amount of the average time input of the people actually carrying out the activity (gives a somewhat more realistic picture of the perceived time input than the index 'A', which is insofar 'average' that concretely noone can be characterised by it).

³ In statistics and sociology the data collection and the data gained from this is called time scales which explores the time management of the society, its changes and differences.

The trend of the decrease in working hours and the increase in leisure time is shown by index ‘A’, at the same time we can see that those working the most work more than 12 hours a day. Index ‘C’ indicates this significant differentiation in time-proportion of the bread-winning activity. Let us have a look what else accounts for this seemingly striking trend of the decrease in the total working hours apart from the ones mentioned. In the first place the following facts are behind it.

- The change in the society structure (the change in the rate of the actually employed and actually unemployed part of the population).
- The change in the economy structure (the ratio of the white-collar workers has risen while the number of the agricultural workers employed in the greatest amount of working hours has decreased to its fractions).
- The change in the employee structure (the ratio of those with 8 classes of primary school has dramatically decreased, who has to work more for less, the study time has lengthened).
- The decrease in the legal daily, weekly and annual working hours.

Chart 1 - Time spent on working (in minutes) within the segments of the ones working the least and the ones working the most at the last data collection (1999 – 2000)

Activities	1. fifth		5. fifth	
	male	female	male	female
wage-earning activity	331	301	733	629
- main job	318	292	669	580
- additional income	3	3	13	13
- job not paid	10	6	50	36

Source: Töröcsik, 2003.

From the areas connected to the lack of time only the ones being in relation to our topic’s aspects are mentioned so we do not deal with the e.g. psychological or health-related effects of time pressure. Based on the data originated from the time scales we can assess that

- the continuous reduction of the time spent on wage-earning has proved to be true (it has decreased by its one fourth compared to the sample from 1986 – 87), what is more, from Chart 2 it can be seen that leisure time (19 %) exceeds working hours (15%) – we keep emphasizing that it is true only regarding the society as a whole – and
- the ones experiencing the opposite are also right. From Chart 1 we can see that one fifth of the society spends half of the day of 24 hours (1440 minutes) on working, as a result, it is typical that very little time is left for other activities.

Chart 2 - On the ratios of time consumption

Types of activity	Daily time portions
Physiological needs	~47 %
<i>Leisure time</i>	~19 %
<i>Wage-earning activity</i>	~15 %
Activity in connection with the household	~12 %
Transport	~ 4 %
Learning	~ 2%

Source: Törőcsik, 2003.

From these statistics it turns out that the time spent on earning money by a relatively broad layer is not at least decreasing but is significantly increasing, as mentioned earlier, this amounts to 12 hours at present (according to the data of the time scales of 2000). This can be one extreme but by diversification of time the possibilities can vary on a wide scale. The regular working order of the socialist era has disappeared together with the socialist industry, ‘mass time’ has evaporated in which all the people were dictated to live in nearly the same rhythm. Today everyone starts and finishes work at different dates, many of us manage it themselves. Time has diversified.

At present different groups of the society can be categorized into different layers based on their different attitude to time as well.

As varieties of the layer-forming criterion we can make the categories time-sensitive and time-inflexible, since there are strong differences between the members of the two groups from several aspects. As a starting point we can make use of the trends and counter-trends based on time which can be seen in consumption and are also detailed by Törőcsik (Törőcsik, 2007). We will summarize the most interesting ones based on Törőcsik as follows.

2.3. Trends based on time

The results of the future-research, trend-research appreciate at times when changes are unpredictable and occur all of a sudden or very frequently, the consequences of which arise extensively and we do not know exactly what these will be. The change in the attitude towards time is not a novelty and cannot be related to the formation of the information society. The recognition of time as a value is related to the industrial societies where time passes not purposeless and not in a natural cycle but becomes the resource of material values (Gurevics, 1974). The attitude to time is not only determined by history but by space as well, there are huge differences between cultures also today (Hofstede, 2001). Hofstede and Trompenaars, two significant scholars of intercultural researches have also studied the differences between temporal dimensions within individual nations ([Hunyadi-Székely, 2003). Levine (Levine, 1998) who conducted researches into the relationship among the attitude towards time, time and the pace of life in different countries.

He came to the interesting conclusion that the more effective of a country's economy is the faster the pace of life is, and the more industrialised a country is the less leisure time people have, and the more urbanised a country is (there are more cities) the faster people move. In the following we will mention some trends which can be already seen these days. The first chart depicts the ratios of time consumption per day.

2.3.1. Consequences of the lack of time

The use of time varies disproportionally in case of those working much and those not working, with consequences arising in life style and in consumption structure as well. Those working much have an increasing need for products and services with which they can spare time.

They can be regarded as 'new' consumers having different features compared to the 'old' ones. The time-sensitive layer which depends on time expects shopping facilities without limitations, so non-stop continuous opening hours (7/24, on every day of the week 24-hour) or availability due to their special schedule. This is the *trend of continuity*, its appearance can be noticed already today. Much work is coupled with higher income so time becomes more scarce goods than money. Having time and money categorises the members of the society into different groups, as shown by Figure 1.

<p style="text-align: center;">much time and little money</p> <p style="text-align: center;">(life-long students, poorer pensioners, bohemians)</p>	<p style="text-align: center;">much time and little money</p> <p style="text-align: center;">(wealthy pensioners, rich married, lottery winners, free loaders of the new wealth)</p>
<p style="text-align: center;">little time and much money</p> <p style="text-align: center;">(managers, entrepreneurs, well-paid families and families with two wage-earners)</p>	<p style="text-align: center;">little time and little money</p> <p style="text-align: center;">(poor workers, low-income families)</p>

Fig. 1 - On the consumer segments increasing in the fastest way (Bosshart, 2004)

The above facts have consequences in relation to logistics as well, as customers being in lack of time take advantage of time-saving shopping possibilities (e.g. catalogue, internet) which transform the significance of the channels of distribution and creates new ones. Another effect is that logistics has to prepare for the end consumer as well to solve the so-called last-mile problem (with home delivery) extensively.

A ‘*cocooning effect*’ is very typical, accompanied by the home as a spot for arranging more and more things (shopping, different services). Consequently, the task of logistics is not completed by forwarding the goods to the distributors and intermediaries where the product was picked up by the consumer up till now. It is getting more and more widespread that the product goes to the consumer. The so-called CEP (Courier-Express-Parcel) or express logistics companies are specialized in meeting such demands and are able to expand at a greater pace compared to the traditional carriers.

2.3.2. Improvement of time demand, Kano model

The need to operate in a real-time manner is filtering through to other areas far away from technology as well. Getting used to immediacy we become impatient in other situations if we have to wait. However, our impatience is built not only by the information speed but other progresses taking place at other walks of life also influence our changed time conscience. The roots of *immediacy* or rather the *real-time trend* have been discussed earlier, but we have to add that the fast-services developing in more and more fields have an accelerating effect on these needs. The dynamic character of the model by Kano explains the nature of the change in the time expectations. Figure 2 shows the level of satisfaction accompanying each time performance. The grade of satisfaction is changing depending not only on quickness but on getting used to it as well. It means that as time passes an inspiring level of performance – quickness, punctuality – is becoming one to be expected and another inspiration can be reached only by achieving other grades. Thus those providing services also themselves generate the need for faster and faster solutions.

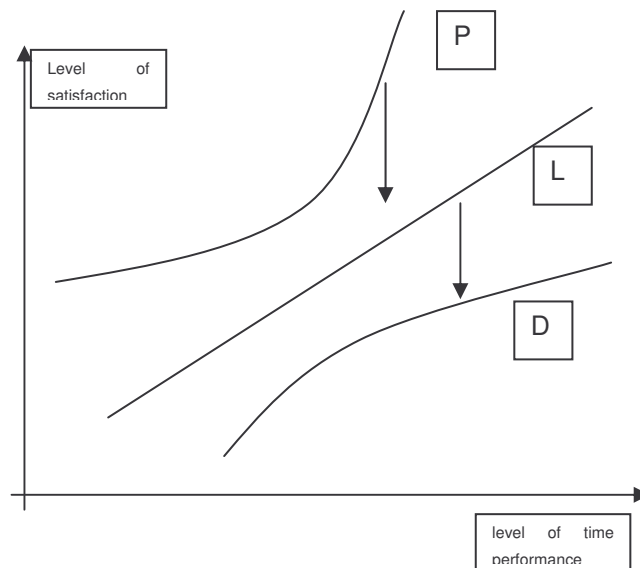


Fig. 2 – Kano model about the relationship between the parameters of customer satisfaction and obtaining product (service) (Kano-Seraku, 1984)

P: Progressive relationship

L: Linear relationship

D: Degressive relationship

The relationship between the parameters of customer satisfaction and product (service) obtaining has three types (Figure 2):

- Degressive relationship, expected performance: the improvement of parameters increases satisfaction in a decreasing way, their non-performance triggers high dissatisfaction (negative satisfaction) (Curve D). The fact of obtaining can be regarded as an expected parameter in itself, which cannot be connected – or can be only in the long term – to temporal dimension, but the parameter of punctuality (the divergence between promised and performed dates) works in the same way (in judging this there are huge differences between different cultures).
- Linear relationship, quality of performance: the improvement of the parameters results in an increasing improvement in the satisfaction of direct proportion to it (line L). Among the parameters regarded as performance we can mention rapidity. The shorter it takes to obtain a product or a service (access time) the more satisfied we are.
- Progressive, inspiring quality: an improvement in a unit results in an improvement in satisfaction by more than a unit (Curve P).

The promise and performance evoking the sense of immediacy can be categorized here with other factors the customers have not thought of but when offered he finds it very useful (the judgement of the grade of usefulness differs within the different customer segments and product groups).

There is free access between the grades and by getting used to rapidity they change into the direction of the degressive relationship. The actual judgement of the temporal performances depends on the time culture of the external environment, the time attitude of the consumer and on the nature and role of the product/service.

3. Responses based on time

With the increase in the need for the rapidity and cheapness of access time [Saibal-Jewkes, 2004] we can also see some trends with the opposite effects among the global production trends. With the specialisation and concentration of production we can take advantage of scale economies by the decreasing costs per unit, however, the costs of logistics will increase between the actors – getting far away from each other physically - of the supply chain. Thus the later sales price of a product will include the costs of space- and time utility of a product in an increasing proportion while the costs of utility value generated by production will decrease. More studies have proved that the decreasing access time increases the needs and is coupled with a greater willingness to pay (Karmarkar, 1993). The demand for a spatial and temporal availability is increasing at all levels of the supply chain while the chain itself is lengthening due to the actors, suppliers, producers, intermediaries, customers getting further and further from each other. The production process involving more actors creates new supply chains so the problem of expanding it not only in a vertical but in a horizontal or diagonal direction needs to be solved.

The customer need for fast service shows in the same direction as company's ambition to decrease lead time. Time management is rooted back to the Taylor-times when during the work organisation the working time need of each process was compiled from elements divided into movements. An analogous way of thinking may be required on the time-management of the supply chain. The application of management methods and philosophies during the production had already started which influenced time consumption and time management as well.

By now it has turned out that time itself also behaves like a resource that has to be managed. Therefore within the supply chain not only the interior solutions aimed at time-saving within the company but the spatial and temporal expansion of remote processes arranged by different actors and with different time-consumption is also of high importance. Literature on the competition strategies based on time is also aimed at the temporal integration of the different levels of the supply chain. Among these we can find the methods being popular nowadays such as just-in-time, lean production, quick response, ECR (efficient customer response), etc. (De Toni-Meneghetti, 2000)(Nahm, et al. 2003)(Saibal-Jewkes, 2004)(Tu, et al. 2001). Based on these we can distinguish the internal – measurable only by the company - and the external – perceived also by the customers - form of time performances (De Toni-Meneghetti). Figure 3 depicts the internal and external appearance of time performance.

<div style="text-align: center;">Time performance</div> <div style="text-align: left;">Phase</div>	Internal	External
Product development	Time to market	Frequency of introducing -new products -existing product improvements
Procurement Production Distribution	Lead time -procurement -production -distribution	Delivery time -speed -punctuality

Fig. 3 - Internal and external time performance (De Toni - Meneghetti, 2000)

Logistics has to find delivery solutions adjusted to the consumption behaviour of products which generates *many kinds of logistical needs* to be seen already today. However, the *deliveries of higher frequency and less volume* resulting from this trigger higher costs and higher damage to the environment. These trends make greater cooperation and tighter connections necessary within the supply chains, and they have to create logistical service providers being able to provide complex logistical services.

Predictions on logistical trends can be read in more international studies (e.g. SULOGRTRA, 2000). Chart 3 shows the direction of the international trends referring to the FMCG⁴ (Fast Moving Consumer Goods) sector.

Chart 3 - On the international trend of the FMCG sector

TREND	Direction of change
Application of transloading systems	+
Production concentrated in space	+
Inventory management concentrated in space	+
Deliveries due within a day	+
Rationisation of the supply base	+
Direct deliveries	-
<i>Time-saving principles</i>	+
Inverse logistics	+

Source: Duleba, 2007.

The trends are specific to a branch but prevailing directions are also being outlined, for example the time-saving principles emerge everywhere. According to Duma (Duma, 2007) the tendencies of the supply chain can be summarized as follows:

- *Increase in speed*
- Competition of the supply chains
- Transfer of inventory into delivery, concentration
- Supply chains back and forth are created (inverse logistics, customer competencies)
- Network restructuring (geographical restructuring of production sites)
- Mobility of production-consumption (we produce or consume while 'travelling')

⁴ FMCG Fast Moving Consumer Goods

- 'One-stop-shop' – One-window service
- Logistical services are characterised by enriched product
- Production strategies are undergoing transformation
- Transparency as a condition for the system
- Increase in uncertainty and the importance of its handling

Logistics is a service activity, it can deliver what is ready-made and what has a customer. The most important qualitative requirements for logistics are rapidity, punctuality and reliability. All of them can be formulated as a time performance. If time is defined as the distance between two events, then expectations and the level of their service can be set as parameters. Customer satisfaction is decided by the relationship between expectations and their performance. This way logistical activity can be interpreted from two aspects, from the 'process voice' (the company providing service) side as a level of service, from the 'customer voice' side as customer satisfaction. Performance measurement in a classical sense is meant to measure the efficiency of some activity (i.e. the ratio of the output and the input necessary to create them). Earlier logistical performance measurement was also defined as a connection mainly to the cost accounting, however, in the past years the on the measurements based on not exclusively financial indexes are laid more emphasis. Figure 4 summarizes the three main aspects of logistical performance measurement.

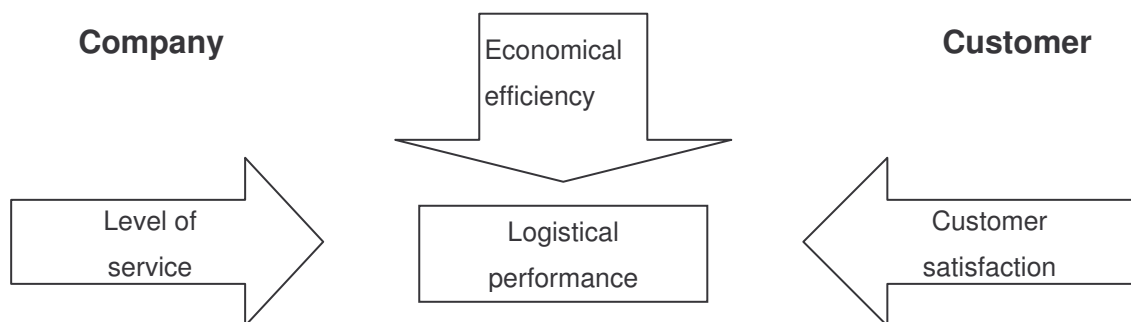


Fig. 4 - On the directions of logistical performance (Duma, 2007)

The requirement of rapidity and punctuality serves as basis of the time performance. If we 'translate' these performance-expectations, so we express them with the help of time, rapidity can be defined as the length of lead time – i.e. the temporal distance between the order (starting event) and the delivery (finishing event), punctuality is shown by the difference

between the promised and the rendered arrival times (Nagy, 2007). So rapidity is the brevity of lead times. It is measured as a difference between the finishing and starting dates, according to the metrics below (SCM metrics):

- customer order promised cycle time – from the order until the delivery undertaken
- customer order actual cycle time - from the order until delivery
- manufacturing cycle time – from the order until the production of a product
- transit time – from the warehouse to the customer (between the two points of the supply chain)
- Inventory replenishment time – from the order until the production+ transport from the warehouse
- truck turnaround time - from starting the carrier task until arrival to the location
- supply chain cycle time- end to end cycle time – theoretical maximum cycle time (assuming customer service without inventory)
- cash to cash cycle time – from settling the supplier invoice until the arrival of the counter value of the payment (Nagy, 2007)

Temporal punctuality can be valued as an absolute difference – delay – as a difference between the planned and the actual arrival time (referring to one delivery), and defines punctuality with an index based on proportion (in percentage of the total amount undertaken). Evaluation of the indexes based on difference can take place compared to a fixed tolerance or it can be decided this way whether a delay requires intervention or not. Evaluation of the indexes based on proportion also deviates depending on whether they are calculated per products, per units or per orders, and, whether measurement is carried out in value or in items. Apart from these the measurement interval also matters (month, quarter, year) as for the longer period the level of service is measured the more unpunctualities disappear.

4. Summary

In our study based on the changes in the attitude to time we have reviewed the trends triggered by the network economy emerging in consumption and service. The increasing importance of time has been originated from technological development, shortening life cycles, mobility and the change in use of time.

We have introduced empirical devices (time scales, time-space scales, time maps) being capable of studying the changing attitude and use of time and to depict and visualize their consequences. We have also highlighted the complementary role between marketing and logistics in connection with planning the time-based strategies.

From the aspect of time performances' efficiency and measurability we have surveyed an area with high reserves for reducing time. By dividing the whole cycle time into sections we have introduced metrics making the fulfilment grade of the most essential customer expectations measurable and informing the service provider on the level of service at the same time.

Using time as a measure holistically creates a deeper understanding of the total business process, and therefore provides scope for optimization. It also provides a pragmatic approach to change. The use of time in this context is directly linked with competitiveness and will be referred to as the time-compression approach.

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