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POSSIBILITIES OF TRANSPORTATION SYSTEM MANAGEMENT THROUGH MARKET ACTIVITIES

ABSTRACT

In the whole cycle of production, distribution, exchange and consumption, the market is the place of exchange and realisation of the manufactured products and services. Market is the main form of link between the producer and the consumer; it is on the market that supply and demand are balanced, the two basic market categories.

Because of the specific characteristics of the transportation process, the economic theory considers that there is no unique market of traffic services, but rather that there are transportation markets on certain relations. Thus, one can speak of the imperfection of the transportation market and its impossibility to balance traffic supply and demand due to unity of supply and demand, due to non-flexibility of traffic supply regarding traffic demand, due to technical characteristics of traffic infrastructure, and due to various technical and technological characteristics of certain transportation branches. Therefore, the relations between supply and demand cannot be regulated automatically by transportation market, and consequently, neither can the structuring of the transportation system rely only on the influence of the transportation market. This is why government appears as the corrective measure of the market, i.e. government regulation of supply and demand. This government regulation is realised through general economic and transportation policy.

KEY WORDS

transportation system, market, system management

1. DEFINITION, CHARACTERISTICS AND STRUCTURE OF THE MARKET

In this section it is necessary to start from the definition of the market, its characteristics and its structure so that later its specific features and some disadvantages of the transportation market may be presented.

In the Foreword of the 14th edition of their capital work Economics, the US authors, P.A. Samuelson and W.D. Nordhaus in the text subtitled "Rediscovery of the Market" noted:

"World-wide nations are discovering the power of the market as tools for resources allocation. The most dramatic example happened, of course, during the "Velvet Revolution" in Eastern Europe during 1989, and after the coup in the Soviet Union in August 1991. One after the other the nations unseated their communist leaders and abandoned the non-market economy. In 1990 Poland started a significant experiment of "shock therapy", introducing marketing into the great part of its industry. Other countries followed in a more gradual way. They believed people would be stimulated to invest adequately and to work a lot if the market defined the prices, outputs and income.

Market has been rediscovered in the market economies. Many countries deregulated their industry sectors or "privatised" those industries that operated within the public sector. The results were generally successful, since productivity increased and prices decreased. Some economists recommend that market mechanisms should be used for environmental protection, defining pollution tax as the most efficient way of controlling harmful pollution¹."

Else, when speaking of the definition of the market, it is usually and most briefly defined as "a meeting of supply and demand" which in turn requires supply and demand to be defined separately. In one of our earliest lexicons dealing with economic issues and problems, market is defined as a "set" of relations between supply and demand in a certain area and at a certain time. It is the summation and interdependence of all the regular contacts between the manufacturer i.e. seller and the consumer, i.e. buyer, because of exchange of goods. Market is also often regarded as a certain place where sellers and buyers meet in order to exchange the goods (market-place, fairgrounds, exchange, fairs). It is also considered to be a certain institution or organisation whose aim is to concentrate on one place or to balance supply and demand (trading network, exchanges, auctions, fairs, etc.). Previously, market was related to a certain place and to the personal presence of the seller and the buyer, as well as the physical presence of the goods. As the result of

the development of economy, technology and information systems, market is becoming less dependent on the physical presence of the goods. Market relations are becoming increasingly complex.

Apart from the seller and the buyer, various other subjects, such as banks, insurance agencies, transportation companies, etc. appear on the market, i.e. in the exchange process. The modern market does not require personal contact between the seller and the buyer any more, nor the physical presence of the objects of trading. Besides the already previously present media such as post, telephone, teleprinter, fax, radio connection, etc., the modern world market is marked by Internet as the medium of establishing fast connections between the seller and the buyer. The goods are replaced by samples, types, standards, specifications and various promotion and marketing materials and ways of presenting goods and services. As already mentioned, market is a very complex relation between supply and demand. It is obvious then, that there are different markets, different types of markets and that market can be divided according to various criteria. Thus, some of the basic criteria used to distinguish, i.e. classify market are as follows:

1. space i.e. scope of coverage,
 2. government – legal feature of the area,
 3. object of supply and demand,
 4. type of goods and services,
 5. level of governmental influence.
- Regarding **space i.e. scope of coverage**, market can be:
1. local, if it covers the area of the district, town (county in our country),
 2. regional, if it covers the area of one or several minor countries,
 3. world or global, if it includes the exchange among the majority or all the countries in the world.
- Regarding **government – legal feature of the area**, market can be:
1. interior (or domestic), if the exchange is carried out within the borders of one country,
 2. external or international, if the exchange is carried out between two or more countries.
- Regarding **object of supply and demand i.e. object of exchange**, market can be:
1. general, if the exchange involves a great number or all types of goods and services,
 2. specialised, if the exchange involves a certain product or service, a group of products or services or a certain type of product or services.
- Regarding **type of goods and services**, market can be:
1. raw materials market,
 2. oil market,

3. capital assets market,
 4. food products market,
 5. shipping products market,
 6. tourist services market,
 7. capital market,
 8. labour market,
 9. etc.
- Regarding **level of governmental influence**, market can be:
1. free, if government has no direct influence on the market thus allowing for competition.
 2. regulated or controlled, if the government, various economic subjects or monopolies control the prices, supply and demand.

Since the very beginnings of goods exchange until today i.e. until almost complete globalisation of economy, three basic functions or tasks of the market have been highlighted:

1. In the whole cycle of production, distribution, exchange and consumption, the *exchange and realisation* of the manufactured products and services are being carried out on the market. Since the manufacturer's individual productivity reached the level at which he could manufacture more products than required to meet his personal demands and those of his family, he started to offer the excess of manufactured products in exchange for some other products with some other manufacturers.
2. The market is **the main form of link between the manufacturer and the consumer**. For this reason commercial financial and transportation services have been included in the relations between the production and consumption, in order to connect the manufacturer (seller) and the consumer (buyer).
3. Connecting numerous manufacturers (sellers) and consumers (buyers) the market **balances supply and demand**, the two basic market categories. It is precisely this "establishment of connections" between the seller and the buyer which represents competition, a match.

2. SPECIAL FEATURES OF SUPPLY AND DEMAND IN TRANSPORTATION

In the traffic service generation process, in the transportation process, a new product is created – transportation service, that has its value, which is exchanged in the market according to its price i.e. monetary value.

The essence and the specific features of the transportation process as the technological manufacturing process in transportation come to the fore through three basic characteristics.² These are:

1. overcoming spatial distances,
2. unity of the manufacturing process and the consumption process,
3. inseparability of the manufacturing process results from the manufacturing process itself.

2.1. Overcoming spatial distances

The essence of the transportation process is reflected in overcoming spatial distances. Transport means and objects of transport in the transportation process move from one place to another while infrastructure and superstructure objects remain fixed, related to a certain place, with *locus standi*. The sense, essence and goal of the transportation process lie in the very fact that goods and passengers as well as the objects of transportation move from one place to another using transportation means. It is precisely this moving that represents the process of generating transportation service. In no other process is there a situation like this.

In all the other production processes, the technological process occurs in one place, a factory, a field, a hotel, etc. Only in the transportation process does the change of location occur. This naturally causes grave difficulties in the technology and organisation of transport, and the solution of such problems is the topic and object of transportation technology operation, as well as of theoretical and practical discipline.

2.2. Unity of the manufacturing process and the consumption process

Transportation process is the only technological manufacturing process with the spatial and time unity of production and consumption. Transportation services generation occurs simultaneously with its consumption, and both processes represent in fact, economically, supply and demand. Transportation services generation represents the supply of production services. The consumption of transportation services represents the demand for transportation services. Transportation services supply is in fact the supply of transportation capacities, and, as known, can be *static* and *dynamic*. Static capacities are the installed capacities of transport means and the throughput capacity of infrastructure, and dynamic capacities are the function of static capacities and turnover of these capacities in time unit.

2.3. Inseparability of the manufacturing process results from the manufacturing process itself

Transportation service as a result of the production process is not characterised by the same feature as some other material products existing outside the production process, after its completion. Transportation service, for instance, cannot be stored like some other products of material manufacture (industrial, agricultural). This feature influences significantly the organisation of the transportation process which consists in fact in satisfying the traffic demand by the supply of transportation capacities. It is because of this feature, i.e. the fact that transportation services cannot be produced and stored in order to satisfy the traffic demand when it exceeds the traffic supply, and because of the fact that transportation capacities are fixed over a certain period of time while traffic demand varies, that great difficulties arise in the organisation of the transportation process, particularly in cases when traffic demand shows a sudden increase.

3. IMPERFECTION OF TRANSPORTATION MARKET DUE TO UNITY OF SUPPLY (PRODUCTION) AND DEMAND (CONSUMPTION)

According to the definition of the general economic market theory, market is, as we have seen, a complex of relations between supply and demand in a certain region and at a certain time. It has also been shown that rules of supply and demand act in the following way:

- If on a market with an already determined price, the demand for certain goods increases with relation to its supply, or if the supply is decreased in relation to the existing demand, the price of the goods increases.
- If, however, the demand decreases, and the supply increases, the price decreases. On the other hand, prices influence supply and demand; they have the tendency to stabilise at a level at which supply and demand of certain goods become equal; every price increase reduces the demand and increases the supply, and every price reduction increases the demand and decreases the supply.

This relation between demand, supply and price and their constant modifications result in balancing of supply and demand on a market for a certain kind of goods or services.

Three basic characteristics of transportation production technological process give specific feature to the traffic supply as one of the two basic segments of the transportation market. Producers of transporta-

tion services offer their products in a certain region, in a certain network, in a section of a network, i.e. concretely, on a certain relation. On the other hand, specific characteristics of the transportation services production process give a specific feature to the traffic demand as the second basic segment of the transportation market. Namely, the traffic services users can realise their demand only within a certain region, a certain network, a section of a network, i.e. within a very specific destination. Due to such specific characteristic of transportation services supply and demand, the theory of transportation economics considers that there is no such thing as a single market of transportation services, and that one can only speak of a transportation market comprising certain destinations. This means that transportation market is far from perfect and that it cannot balance its supply and demand by competition, because, from the aspect of relations between total supply and demand, these single markets cannot be understood as a simple summation of independent markets, but rather as a complex of interconnected and interdependent relations in the whole transportation network.

4. IMPERFECTION OF TRANSPORTATION MARKET DUE TO NON-FLEXIBILITY OF TRAFFIC SUPPLY VERSUS DEMAND

The pattern of relations between traffic demand and traffic supply lies in the fact that traffic supply is not sufficiently flexible with relation to traffic demand, precisely owing to the fixed character of transportation capacities for a certain servicing zone.

The fundamental theoretical and practical issue resulting from uneven traffic demand and the fixed character of traffic supply is at what level of values should the traffic supply i.e. the transportation capacities (fixed and flexible) be dimensioned, no matter whether regarding capacities in the passenger or freight road transport, throughput capacity of the motorway, airport, railway line, etc., and whether the volume of supply i.e. capacity dimension can be influenced by market competition.

To the first question, i.e. at what level should the capacities i.e. supply be dimensioned, mainly three theoretical and practical answers are possible:

- capacities should be dimensioned at the level of minimal traffic demand values for a certain servicing zone;
- capacities should be dimensioned at the level of mean or average traffic demand values for a certain servicing zone;

- capacities should be dimensioned at the level of maximal or peak values of traffic demand for a certain servicing zone.

These relations of values between traffic demand and traffic supply are presented in Figure 1.

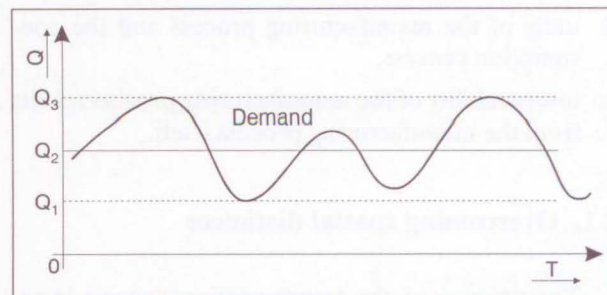


Figure 1

where:

- Q – quantum (demand, supply),
- T – time,
- Q₁ – minimal demand value,
- Q₂ – medium demand value,
- Q₃ – maximal demand value,
- Q – T – servicing zone (observed period).

1. Should the capacities be dimensioned at the level of minimal values of traffic demand (Q₁), then they could not meet the demand which is above the minimum. Therefore, such a solution should be rejected a priori, since, although requiring least investment funds, it offers unacceptable quality in satisfying traffic demand from the traffic and technological aspect.
2. Analysing the possible solution at the level of average values of traffic demand, it should be determined first of all whether this refers to annual, seasonal, monthly, daily or hourly average demand. Should the capacities be dimensioned at the level of average traffic demand values (Q₂), then they could not meet the demand above the average values. Therefore, it is obvious that practical technological solutions also reject this second possible theoretical answer, since such a solution would mean that in all cases when the traffic demand intensity is greater than the average, it cannot be met since the capacities would not be sufficient. All these cases are far from providing regular and good transportation.
3. Should the capacities be dimensioned at the level of maximal or peak values of traffic demand (Q₃), taking into consideration not only peak hourly values but also peak values within the peak hour, then all the values of traffic demand could be satisfied and regular and good transportation could be guaranteed. Technologically, such solutions would be by far the best, but, economically, such solutions

require greater investments and generate greatest exploitation costs.

Concrete practical solutions should, therefore, satisfy maximally both the technological and the economic principles. Starting from the principal requirement that traffic demand has to be satisfied by adequate supply of capacities, both mobile and stable, the dimensioning of capacities should be brought as close as possible to the maximal values of traffic demand, and, taking into account strong economic reasons, there are corrective factors that balance the technological and economic reasons to a satisfactory extent.

5. IMPERFECTION OF TRANSPORTATION MARKET DUE TO TECHNOLOGICAL FEATURES OF TRANSPORTATION INFRASTRUCTURE

As known, transportation infrastructure (and superstructure) represents those transportation facilities which in the transportation process i.e. in the process of generating traffic service, allow in fact technically or simplify the movement from one place to another by transport i.e. traffic means. The infrastructure and superstructure objects are of artificial character, that is, they are "artificially created" objects, into which capital has been invested and that are expected to behave in a profitable and economic way.

Classifying technical means in traffic into transportation (traffic) means and infrastructure is of special significance, not only because of their different technological features, but in certain transportation branches first of all as a function of their organisational and economic characteristics. The technological and economic features of transportation infrastructure, from the aspect of financing its reproduction and from the aspect of its position on the transportation market, in theoretical and practical sense differ considerably from the characteristics of the transportation means in the narrower meaning of the word (means of transport).

6. IMPERFECTION OF TRANSPORTATION MARKET DUE TO DIFFERENT TECHNOLOGICAL CHARACTERISTICS OF CERTAIN TRANSPORTATION BRANCHES

In satisfying traffic demand some transportation branches show, depending on their technical and technological characteristics various advantages, that is, certain transportation branches satisfy in quality different traffic demands. This does not mean, however, that the vehicles of a certain transportation branch

cannot satisfy traffic demand both in passenger and in cargo transport, nor that the means of one transportation branch can transport only mass, and not high-value cargo as well. With provision of necessary prerequisites certain branches are capable of achieving quite satisfactory transportation effects in all the forms of traffic demand (regarding transported objects, regarding the distance), although, of course, certain transportation branches are completely excluded from the possibility of satisfying certain forms of traffic demands.

The imperfection of transportation market due to different technical characteristics of certain transportation branches results from the fact that every up to now known transportation branch shows certain objective advantages compared to other branches. It is then difficult to speak of absolute competition among transportation branches since traffic demand consists of transportation branches that have different advantages according to their technical characteristics. When talking about advantages, i.e. assessment of certain transportation branches, then we have in mind the following criteria: economical quality, energy consumption, environmental protection, transport capacity, transport speed, availability, safety, regularity, punctuality, demand adaptability.

7. POSSIBILITY OF BALANCING TRAFFIC SERVICE SUPPLY AND DEMAND THROUGH MARKET ACTIVITIES

In order to be able to speak about the possibilities of balancing the traffic service supply and demand through market activities, and thus of establishing optimal structure of the transportation system as the basic aim of managing the transportation system, a number of prerequisites i.e. assumptions would have to be provided. We have, however, until now identified a whole series of specific characteristics of the transportation market, but to answer the question about the role and possibilities of the transportation market to affect the forming of an optimal traffic system structure, it is important to know that transportation market can be theoretically discussed in the right manner only if a certain relation is treated as an isolated transportation market. This means that the relations between transportation service supply and demand can be possibly balanced at certain relations i.e. in certain traffic corridors through transportation market activities.

The former case, when certain relations are considered, deals with the possibility of transportation market activities affecting the balancing of transportation service supply and demand and the forming of certain competitive relations only within a certain

transportation branch. And indeed, competitiveness can be identified in certain relations within road, maritime, river and air traffic.

In the latter case, regarding certain traffic corridors, one might speak of the possibility of transportation market influence on the balancing of supply and demand and on establishing of certain competitive relations between certain transportation branches that operate in a concrete traffic corridor only in the case if concrete traffic demand can be satisfied by traffic supply of any transportation branch operating in that traffic corridor. However, one should keep in mind the different traffic, technical and economic possibilities of certain traffic branches on the one hand, and different requirements that certain transported objects have on the transportation system, on the other hand, thus reducing the possibility of choice made by the users, as well as reducing the possibilities of competition even for those transportation branches that operate in a certain transportation corridor.

Therefore, transportation market is such a market where no essential prerequisites exist regarding free competition due to the lack of sufficient flexibility of both supply and demand, which means that there are no basic economic prerequisites for free operation of the rules of the market. The relations between supply and demand cannot be regulated by automatism of the transportation market. It is therefore impossible to rely only on the influence of transportation market in structuring the transportation system, i.e. in regulating the relations between certain transportation branches in the transportation system.

The possibilities of the transportation market, i.e. the influence on establishing a certain traffic system structure are very limited. Therefore, the corrective measure of the market is the government, i.e. government regulation of supply and demand. This government regulation is carried out through general economic and transport policy.

8. CONCLUSION

Economic and theoretical analysis of the essence and characteristics of transportation production process, considered from the aspect of forming the transportation services supply and demand, leads to the following conclusions:

1. Traffic production process generates a new product – transportation service, which has a value and which is exchanged on the market through its price i.e. monetary form of this value.
2. The market provides three basic functions or tasks: exchange and realisation of the products and services occurs on the market, market represents the main form of link between the producer and the

consumer, supply and demand are balanced on the market.

3. On the other hand, the essence and specific features of the transportation process are expressed through three basic characteristics which are: overcoming spatial distances, unity of production and consumption processes, the impossibility to isolate the results of production from the production process itself.
4. Unity of supply (production) and demand (consumption) of the transportation service makes it impossible to balance supply and demand through market activities, i.e. transportation market is imperfect due to the unity of supply and demand.
5. Due to the fixed capacities of infrastructure and superstructure and the given transport capacities for a certain servicing zone, transportation market supply is not flexible with regard to demand. This fact reduces considerably the possibilities of the market to balance supply and demand in transportation.
6. Due to different technical characteristics of certain aspects of transportation, i.e. transportation branches, they show different advantages (and disadvantages) regarding certain type of traffic demand. This questions their free and equal competition, and thus also the possibility of the market to balance the categories of supply and the categories of demand.
7. All this leads to the final conclusion that transportation market is imperfect, that the possibilities of managing a transportation system both in the sense of establishing an equilibrium between supply and demand and of establishing an optimal structure of the transportation system are very limited, and that as the corrective measure of the market, government regulation is introduced through general economic and transportation policy.

SAŽETAK

MOGUĆNOSTI UPRAVLJANJA PROMETNIM SUSTAVOM DJELOVANJEM TRŽIŠTA

U cjelokupnom ciklusu proizvodnje, raspodjele, razmjene i potrošnje, na tržištu se vrši razmjena i realizacija proizvedenih proizvoda i usluga. Tržište je glavni oblik veze između proizvođača i potrošača; na tržištu se uravnotežuju ponuda i potražnja, dvije temeljne kategorije tržišta.

Zbog specifičnosti prometnoga procesa u ekonomskoj se teoriji smatra da ne postoji jedinstveno tržište prometnih usluga već da se može jedino govoriti o postojanju prometnog tržišta na određenim relacijama. U tom smislu može se govoriti o nesavršenosti prometnog tržišta i njegovoj nemogućnosti da uravnoteži prometnu ponudu i potražnju zbog jedinstva ponude i potražnje, zbog neelastičnosti prometne ponude u odnosu na potražnju, zbog tehničko-tehnoloških obilježja prometne infrastrukture, te zbog različitih tehničko-tehnoloških značajki

pojedinih prometnih grana. Prema tomu, odnosi između ponude i potražnje ne mogu se regulirati automatizmom prometnoga tržišta, pa se prema tomu ni ustrojavanje prometnog sustava ne može prepustiti samo utjecaju prometnog tržišta. Zbog toga se kao korektiv tržišta pojavljuje država odnosno državna regulacija ponude i potražnje. Ta se državna regulacija provodi općom gospodarskom i prometnom politikom.

NOTES

1. Samuelson, P. A., Nordhaus, W. D.: *Ekonomija*, 14 izdanje, Mate d.o.o., Zagreb, 1992., str. XVI.
2. Radačić, Ž.: *Ekonomika prometnog sistema*, FPZ, Zagreb, 1988.

LITERATURE

Books

- [1] Bilen, M.: *Tržište proizvoda i usluga*, Mikrorad, Zagreb, 1997.
- [2] Kotler, Ph.: *Upravljanje marketingom*, Informator, Zagreb, 1994.
- [3] Marušić, M.; Vranešević, T.: *Istraživanje tržišta*, Adeko, Zagreb, 1997.

- [4] Padjen, J.: *Prometna politika*, Informator, Ekonomski institut, Zagreb, 1996.
- [5] Radačić, Ž.: *Ekonomika prometnog sistema*, Fakultet prometnih znanosti, Zagreb, 1988.
- [6] Rocco, F.: *Marketinško upravljanje*, Školska knjiga, Zagreb, 1994.
- [7] Samardžija V.: *"Europska unija i Hrvatska"*, Institut za razvoj i međunarodne odnose, Zagreb, 1994.
- [8] Samuelson P.A., Nordhaus W. D.: *Ekonomija*, 14th edition, Mate d.o.o., Zagreb, 1992.
- [9] Dibb, S., Simkin, L., Pride, W. M., Ferrell, O. C.: *Marketing*, European edition, Mate d.o.o., Zagreb, 1995.

Studies

- [1] *Concept and strategy of the long-term social and economic development of Croatia*, Introductory study, Ekonomski institut, Zagreb, 1990.
- [2] *Plan of integration activities of the Republic of Croatia*, Croatian government, Office for European integrations, Zagreb, September 1999.
- [3] *Proposal of traffic development strategy of the Republic of Croatia*, Institut prometa i veza, Zagreb, 1998.