International Journal of Engineering & Technology, 7 (4.8) (2018) 613-617

International Journal of Engineering & Technology

Website:www.sciencepubco.com/index.php/IJET

Research paper

Strategic Management by Enterprise's Transport Potential

Svitlana Kulakova[1], Lyudmyla Boldyrieva[2]*, Iryna Amelina[3], Alexander Goloborodko[4]

[1]Poltava National Technical Yuri Kondratyuk University, Ukraine
[2]Poltava National Technical Yuri Kondratyuk University, Ukraine
[3]Poltava National Technical Yuri Kondratyuk University, Ukraine
[4]Poltava National Technical Yuri Kondratyuk University, Ukraine
**Corresponding author E-mail: Boldyrewaljuda@ukr.net*

Abstract

Two methods of determining the structure of transport potential are proposed: cost and energy. The aim of the research is to study the economic assessment of the transport potential components and its structure should be carried out taking into account certain strategic principles: probability, accuracy and scientific validity of the transport potential structural components, comparability of the transport potential structural components, temporal comparability of the transport potential, comparability of the transport potential by the range of the objects under analysis. It is proved that transport potential (TP) is expedient to determine how the amount of transport works that can be performed at the standard use of the enterprise's transport resources (transport unit) for according to a certain period. It is proved that transport potential is characterized by both stability and volatility. It is determined that the increase of transport potential value has the following limitations: imperative of life safety (growth of transport potential should not worsen working conditions and create threats to people's health); ecological imperative (increasing the volume of transport potential should not cause the complication of the environmental situation and damage the environment).This research reflected that transport resources can be attributed to the primary potential factors.The mechanism for motivating the effective use of transport resources is being implemented. The mechanism includes detection of reserves for reducing the transport volume of products, development of measures on the use of certain reserves for reducing the transport volume of products. Implementation of measures for realization of detected reserves is done reduces the transport volume of products, reducing transport capacity products, and rewarded for reducing the transport capacity of products.

Keywords: *development, evaluation, management, methods, potential, principles, transport, vehicles.*

1. Introduction

A fundamental role in the assessment of transport potential is played by the aggregate amount of resources forming the transport potential, and their correlation in natural form. Determination of transport potential structure is to analyze the individual components ratio of the elements expressed in certain units. The development of competitiveness, both in the region and in the country as a whole, is impossible without identifying and assessing transport potential. Further development possibility of separate segments of transport potential is a determining factor and a prerequisite for the strategy of industry development and services of a certain territory.

2. An overview of the latest sources of research and publications

Traffic accidents account for between 20% and 40% of work-related accidents in industrial countries, and research indicates that road transport companies often have little focus on organizational safety management (OSM). Thus, there is a huge and largely untapped road safety potential in improving the safety of people who drive in their work, by focusing on OSM. Road transport companies in European countries are often small, however, with limited resources in terms of time, financial resources and competence on road safety. The main aim of the present article is therefore to develop an OSM strategy for small road transport companies. Based on a systematic literature review, taking Norwegian research as its point of departure, the article indicates that four measures seem to be most realistic for small goods-transport businesses, and that these measures seem to have the greatest safety potential. These four measures can be arranged on a ladder, where businesses start at the lowest and most basic level. While our stepwise safety-ladder approach has not been validated, it is expected that further research would confirm the value of the strategy proposed [1; 7].

Air transport has developed steadily over the past 70 years into a mature industry. It could now be subject to disruption because technological advances are leading to the development of transport airships. The emergence of transport airships has the potential to create a significant expansion of the trans-oceanic air freight markets, increase geographical coverage and alter world trade patterns. This paper explores the current state of the Hong Kong airfreight industry and examines how transport airships could influence the future of Hong Kong aviation services. A new conceptual model, the value-density cargo pyramid, is developed to conduct comparative analysis among dedicated cargo airplanes, sea-air logistics, sea containers and transport airships, notably in the busy trade corridors between Hong Kong and Europe, as well as, Hong Kong and North America. Based on reasonable assumptions, transport airships could capture up to a half of the existing 'dedicated cargo aircraft' capacity. The race is on to create this new transportation mode and first-movers will have an advantage. This paper provides valuable insights on an immense opportunity that awaits Asian shippers and could take Hong Kong and all of Asia to a new higher level of development and economic prosperity [2].

The study of persistent organic pollutants (POPs) in low-latitude tropical and subtropical urban cities is necessary to assess their local and global impacts on ecosystems and human health. Despite studies on levels of POPs in water, soils, and sediments, analysis of the distribution patterns, seasonality, and sources of POPs in Nepal urban regions remain limited. Polyurethane foam (PUF)-based passive air samplers were deployed in three major cities in Nepal. Isomer and metabolite ratio analyses suggested that the concentrations present were from both new and historical applications of the POPs. Vegetable production sites and their market places appeared to be the major DDT and HCH source areas. Higher atmospheric concentrations of DDT and HCH occurred during the pre-monsoon and monsoon seasons, and winter, respectively, closely associated with their local application for soil preparation and vegetable spraying. The estimated travel distances of the POPs (HCB, α-HCH, γ -HCH, and p,p0 -DDT) under the Nepalese tropical climate were all above 1000 km, suggesting that high precipitation levels in the tropical climate were not enough to scavenge the POPs and that Nepal could be an important source region for POPs. Due to their close proximity and cold trapping (driven by low temperatures), the high Himalayas and the Tibetan Plateau are likely the key receptors of POPs emitted in Nepal. These results added to the information available on POPs from tropical developing countries [3].

This study has provided a baseline of the atmospheric concentrations of Stockholm Convention POPs in urban regions of Nepal, which should be integrated with regional and global atmospheric monitoring campaigns for evaluating the effectiveness of reducing POP levels globally. The study indicates the continued application of DDTs and lindane in vegetable production regions and markets in Nepal, which needs further investigation. Considering the ongoing use of DDTs and lindane in Nepal, the continuous atmospheric transport of the monsoon system, and cold trapping caused by low temperatures, the high Himalayas and the Tibetan Plateau are likely key receptors of Nepalese POP emissions. In addition, increasing HCB atmospheric concentrations in the Arctic have been reported, and continuous HCB emissions from low-latitude regions were attributed to this increase. On the basis of its volatility and the estimated CTD (> 10 000 km), we consider that once HCB is emitted in Nepalese cities, it might transfer among multiple transport systems to reach high-latitude regions like the Arctic [4].

Data from a comprehensive literature search of environmentally relevant physical-chemical properties for nine polybrominated diphenyl ethers (PBDE), ranging from a monobrominated congener to the fully brominated decabromodiphenyl ether, were evaluated and adjusted to achieve both internal and interhomologue consistency. These data were then used in four modelbased long-range transport potential (LRTP) assessment methods. The models TaPL3-2.10, ELPOS-1.1.1, Chemrange-2, and GloboPOP-1.1 were found to yield comparable predictions. A comparison of the LRTP estimates for the PBDEs with those of benchmark chemicals (polychlorinated biphenyls [PCBs]) suggest that the lower-brominated congeners have a LRTP comparable to that of PCBs known to be subject to significant LRT, whereas the highly brominated congeners have a very low potential to reach remote areas. This is in agreement with field measurements in remote regions that indicate that the lighter components of commercially produced PBDE mixtures predominate. Deviations between Chemrange and the models based on the concept of a characteristic travel distance were due to differences in the assumed height of the air compartment, which influences the relative importance of atmospheric degradation and deposition processes. The three models assuming a uniform temperature of 258C may underestimate the LRTP of the smaller congeners. Only atmospheric parameters had a notable influence on the LRTP estimates by TaPL3, ELPOS, and Chemrange, whereas the relative enrichment of chemicals in the Arctic calculated by Globo-POP is additionally sensitive to the parameters related to the interaction of temperature with air–surface exchange and degradation in surface compartments [5].

According to the research, low temperature sensitive products transport and storage is a worldwide issue due to changes of the lifestyle population increase. Thermal energy storage (TES) is nowadays one of the most feasible solutions in facing the challenge of achieving energy savings. Many researchers have investigated energy efficiency of different cold units by applying TES systems using phase change materials (PCM). This paper provides an overview of the existing Spanish and European potential energy savings and CO_2 mitigation by incorporating TES systems to cold storage and transportation systems. Data on energy savings were compiled from different case studies. Results depend on the scenarios studied and the extent of TES systems implementation; in the case of Europe for instance, yearly CO_2 emissions may be cut down between 5% and 22% in reference to 2008 CO_2 emissions from cold production considering that the proposed implementation of PCM TES in the case studies found in the literature is done [6].

Need for energy is continuously increasing with increasing development aspirations and world population. To meet the energy demand, world requires production of more energy from the available limited resources. Technological development is both a cause of many environmental problems as well as a key enabler for solving them. It is a matter of fact that the past technologies are still dominating in transport, energy production, industry, and agriculture sector, which are gradually harming our basic life supporting systems—clean water, fresh air, and fertile soil. However, every sectors there are new technologies available or emerging that may essentially solve these environmental problems if used widely and wisely. Thus, new technologies have the potential to contribute in decoupling of economic growth from pressure on natural resources. To address the global challenges of energy security, climate change, and economic growth, it is a global need to develop low-carbon energy technologies such as bioenergy for heat and power, biofuels for transport, solar photovoltaic energy, solar thermal electricity, wind energy, solar heating and cooling, efficient and environment-friendly energy storage. The long-term sustainability of the global energy systems is essential to counter balance of current demographic, economic, social, and technological trends [1].

In this chapter we present a systems analysis methodology for the first phase of Transition Management, the preparation and exploration phase, in an urban context. The methodology consists of the following four steps, which are followed in an iterative way: (i) system definition, (ii) system structuring, (iii) data gathering and (iv) data assessment and analysis. Characteristic of this methodology is the use of the SCENE sustainability model, in combination with a set of lenses that reflect a variety of ways of looking at the system from macro, meso, and micro level. Together, these lenses ensure an integrated perspective and thorough analysis of a city's government and governance. The systems analysis methodology was applied in the cities of Ghent and Aberdeen to identify the challenges and opportunities in their cities with respect to energy use and CO2 reductions. The outcomes and reflections on their respective systems analyses show that creating an overview of the state of the system revealed interesting connections and that constructing a historical analysis of the city inspired and motivated participants. The systems analysis broadened the problem perception, revealed institutional barriers to sustainable development and served as a catalyst for mutual understanding and learning between the participants. Overall, the systems analysis methodology proved to be an effective method to create an overview of the city activities under study, and stimulated the creation of a common information base and holistic thinking amongst participants in the transition process [8].

A model for dynamic assignment of loading bays for urban last-mile deliveries has been developed. It aims to solve the problem of defining the most optimal number and location of loading bays and their management for energy efficient urban freight deliveries. Optimisation is based on fuzzy k-means clustering of receivers to dynamically select the best possible loading bay in combination with a routing algorithm. The model is tested on the actual data of deliveries in the historical city centre of Lucca, Italy. The results of simulations have demonstrated a significant savings of time and distance travelled by freight vehicles, as well as of CO2 and fuel, in comparison to the existing situation [9].

Electric vehicles seem to offer a great potential for sustainable transport development. The Swedish pioneer project GreenCharge Southeast is designed as a cooperative action research approach that aims to explore a roadmap for a fossil-free transport system by 2030 with a focus on electric vehicles. The results include a sustainable vision for electric vehicle systems in southeast Sweden within a sustainable regional transport system within a sustainable global society, as well as an initial development plan towards such a vision for the transport sector. Some inherent benefits of electric vehicles are highlighted in the vision and plan, including near-zero local emissions and flexibility as regards primary energy sources. The vision and plan also imply improved governance for more effective cross-sector collaboration to ensure coordinated development within the transport sector and between the transportation sector and other relevant sectors. Meanwhile, the new generic process model was refined and is ready to be applied and further tested in the GreenCharge project and in other projects within the transport sector as well as other sectors. The study confirmed that the new generic process model suggested in support of sustainable transport system and community development is helpful for giving diverse stakeholders, with various specialties and perspectives, a way of working that is goal-oriented and builds on effective, iterative learning loops and co-creation [10].

3. Main body

Transport potential can be defined as the total volume of existing cumulative transport resources of the enterprise, which can be used to achieve the maximum possible volume of satisfaction of demand in the market of transport services in the long term, provided that they are optimally used.

By the way, many scholars use the term "motor transport potential" without revealing its essence. However, in our opinion, this term can only be used to assess the transportation capacity of transport companies. Other types of transport are used at enterprises.

At least two methods of determining the structure of transport potential are possible: cost and energy. The cost estimate involves a monetary assessment of the components of the transport potential. The energy assessment is to determine the total energy inputs that are specified in the individual structural components. It is worth noting that each method has its own positive and negative sides. Thus, the "bottleneck" place of the cost method is inflationary influence, and the energy method – the level of reliability of energy equivalents. Both methods are capable of error in assessing the human component of transport potential.

Economic assessment of the components of transport potential, and, accordingly, and its structure should be carried out taking into account certain strategic principles:

– probability principle, accuracy and scientific validity of the structural components of the transport potential, which ensures the objectivity of its economic assessment;

– comparability principle of structural components of transport potential, which should be calculated according to a single methodology;

– territorial comparability of transport potential principle (this principle is taken into account in the case when the territorial boundaries of the region change during the analyzed period, which requires in this case to make an amendment for territorial changes);

– time-comparability of transport potential, according to which its components should be calculated for the same date or at the same time intervals principle (in case of non-compliance with this requirement, an appropriate recalculation should be made);

–comparability of transport potential in terms of the analyzed objects principle (if within the region during a certain period the number of carriers has changed, then at the time of analysis all indicators are processed at a time when the number of transport organizations has not increased yet).

An assessment of the transport potential structure allows us to determine how qualitatively balanced component components are in quantitative terms:

– vehicles – with staffing;

– repair and service base of transport – available vehicles, etc.

Obviously, we should strive to achieve the optimal proportions in the structure of the transport potential of the enterprise, which would maximally ensure the effectiveness of its use.

Transport potential (TP) it is expedient to determine how the amount of transport work that can be performed at the standard use of transport resources of the enterprise (transport unit) for a certain period according to the formula [11]:

$$TP = \sum_{i=1}^{n} n_i p_i, \quad (1)$$

where n_j is number of vehicles i models (brands);

p_j – maximum productivity of vehicles i models (variable, day, year, etc.);

j = 1,… n – the number of models (brands) of vehicles.

The enterprise's transport potential can also be determined by another formula [11]:

$$TP = \sum_{z=1}^{n} T_v N_z, \quad (2)$$

where T_v is number of vehicles;

N_z – normative volume of transport work by a vehicle z models throughout the year;

z = 1,… n – the number of models (brands) of vehicles.

$$T_v = A + P_{nt}, \quad (3)$$

where A is number of trucks;

P_{nt} – number of car trailers.

$$A = \sum_{i=1}^{n} A_i, \quad (4)$$

where A_j is number of trucks i models;

i = 1,… n – number of truck models types.

$$P_{nt} = \sum_{j=1}^{k} A_{p_j}, \quad (5)$$

where A_{pj} is number of trucks j model, which can be operated with trailers;

$j = 1,\dots,k$ – number of models of trucks that can be operated with trailers.

$$T_v \sum_{i=1}^{n} A_i + \sum_{j=1}^{k} A_{n_j} + \sum_{k=1}^{1} T_{\kappa\kappa}, \quad (6)$$

According to the formula, transport potential can be defined as follows:

$$TP = \left(\sum_{i=1}^{n} A_i + \sum_{j=1}^{k} A_{p_j} + \sum_{k=1}^{l} T_{\kappa_\kappa} \right) \cdot N_z. \qquad (7)$$

Transport potential is characterized by both stability and volatility. On the one hand, the transport potential is stable, which is ensured by the activity of the management bodies of the company to stabilize the composition and structure of transport resources (maintenance of rolling stock, loading and unloading means, provision of transport process by qualified personnel, energy resources, etc.) and stable volumes of transport work, which to be executed. Dynamic transport potential acquires in case of use of reserves, laid down in norms of transport works, stable transport technologies, etc.

On the other hand, transport potential is volatile. The factors behind its destabilization are the change in the country's economic policy, market conditions, and so on.

Given the factor of instability, the value of the transport potential should be determined by the formula:

$$TP = \sum_{z=1}^{q} T_v N_z P_z, \qquad (8)$$

where P_z is probability of realization of the transport work standard by a vehicle z model.

The level of transport potential usage can be determined by the proposed coefficient of transport potential usage (K_{tp}):

$$K_{TP} = \frac{O}{TP}, \qquad (9)$$

where O is the volumes of transport work, which are secured by the use of a certain amount of the enterprise's transport resources for a certain period.

Increasing the value of transport potential has its limitations (imperatives):

– imperative of safety of life (growth of transport potential should not worsen working conditions and create threats to people's health);

– ecological imperative (increasing the volume of transport potential should not cause the complication of the environmental situation and damage the environment) [11].

It is important to consider the essence of the resources used in the transport process. It is known that the material resources of the main manufacturer's services include, in particular, those used in transport works. In our view, these resources can be considered transport resources. They must relate to the resources produced, that is, those resources that are produced by humans. Obviously, transport resources can be attributed to the initial (primary) potential factors (stock factors).

If the raw material, as a resource, transforms into products directly in their (resource) use in the production process, then transport resources are characterized by the fact that they can be reused in the transport process. Transport resources, as a potential factor in production, form the basis of transport potential, the use of which is possible in the given or in the survey period. Transport resources, on the one hand, are technical resources, on the other hand - technological ones.

From the point of view of operational management, transport, as a system, uses the appropriate transport resources of an enterprise to produce (render) transport services.

Transformation of transport resources provides for the change of the location of the goods (together with the means of transport, the driver and forwarder) as a result of transportation. Therefore, considering the importance of transport in the production and sales activities of the enterprise, it is expedient to allocate transport resources from the group of material resources.

An important aspect of the functioning of transport resources in a market economy is that they are the subject of market relations and acquire the form of goods, that is, the object of sale, lease, leasing, etc. (Fig. 1).

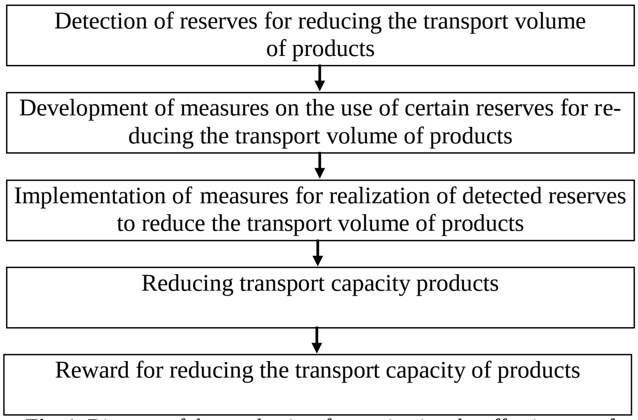

Fig. 1. Diagram of the mechanism for motivating the effective use of transport resources

In view of the need to rationalize the use of transport resources, any enterprise should strive to maximize transport work per unit of transport resource in order to achieve the goals of the enterprise (maximizing profits, providing a marketing niche in the market of transport services, etc.), provided that this does not contradict the economic and other requirements, in particular the current legislation.

Thus, when the transport factor under certain conditions is minimal, it will restrain the increase of production, promotion of it as a material flow through the logistics chain. In this case, one or another branch of the economy will react by changing the production structure toward less transportable and less dependent on the shortage of transport and cargo handling equipment.

4. Conclusions

Thus, disharmony between the levels of production and transport potential can be a barrier to the first and slow down the development of the enterprise, which in the future will complicate the provision of the enterprise the desired state of its competitiveness, will not allow to obtain the most accessible sales volumes and will lead to a lack of profit and more powerful development. In addition, this fact will interfere with the full manifestation of strategic management of the enterprise, and, possibly, the region, the country.

5. Acknowledgement

Taking into account energy crisis situation, the following research should be continued in the sphere of efficient energy consumption in transport.

References

[1] Tor-Olav Nævestad, Beate Elvebakk , Ross Owen Phillips (2018), The safety ladder: developing an evidence-based safety management strategy for small road transport companies / Journal Transport Reviews, Vol. 38, 2018, https://www.tandfonline.com/doi/full/10.1080/01441647.2017.1349207.

[2] Barry E., Yui-yip Lau (2016), Market potential for transport airships in service to Hong Kong; International Journal of Aviation Management Vol. 3, https://doi.org/10.1504/IJAM.2016.078665.

[3] Balram Pokhrel, Ping Gong, Xiaoping Wang, Sanjay Nath Khana, Jiao Ren, Chuanfei Wang, Shaopeng Gao1 and Tandong Yao (2018), Atmospheric organochlorine pesticides and polychlorinated biphenyls in urban areas of Nepal: spatial variation, sources, temporal trends, and long-range transport potential / Atmos. Chem.

Phys., 18, pp. 1325–1336, https://doi.org/10.5194/acp-18-1325-2018.
[4] Hung H., Katsoyianni A. A., Brorstrom-Lunden E., Olafsdottir K., Aas W., Breivik K., Bohlin-Nizzetto P., Sigurdsson A., Hakola H., Bossi R., Skov H., Sverko E., Barresi E., Fellin P. and Wilson S. (2016), Temporal trends of Persistent Organic Pollutants (POPs) in arctic air: 20 years of monitoring under the Arctic Monitoring and Assessment Programme (AMAP) / Environ. Pollut, Vol. 217, pp. 52–61, https://doi.org/10.1016/j.envpol.2016.01.079.
[5] Frank Wania, Chandrasagar B. (2003), Dugani Assessing the long-range transport potential of polybrominated diphenyl ethers: a comparison of four multimedia models. Environmental Toxicology and Chemistry, Vol. 22, No. 6, pp. 1252–1261, https://www.ncbi.nlm.nih.gov/pubmed/12785581.
[6] Eduard Oró, Laia Miró, Mohammed M. Farid, Viktoria Martin, Luisa F.Cabeza (2014), Energy management and CO2 mitigation using phase change materials (PCM) for thermal energy storage (TES) in cold storage and transport / International Journal of Refrigeration, Vol. 42, pp. 26-35, https://doi.org/10.1016/j.ijrefrig.2014.03.002.
[7] Jai Gopal Gupta, Sudipta De, Anirudh Gautam, Atul Dhar, Ashok Pandey (2017), Introduction to Sustainable Energy, Transportation Technologies and Policy / Sustainable Energy and Transportation pp. 3-7. ttps://link.springer.com/chapter/10.1007/ 978-981-10-7509-4_1.
[8] Suzanne Maas, Karen Fortuin, Niki Frantzeskaki & Chris Roorda (2013), A systems analysis methodology for exploring urban sustainability transitions, https://core.ac.uk/download/pdf/29226456.pdf
[9] Tomislav Letnik, Alessandro Farina, Matej Mencinger, Marino Lupi, Stane Božičnik (2018), Dynamic management of loading bays for energy efficient urban freight deliveries / Energy, Vol. 159, pp. 916-928, https://doi.org/10.1016/j.energy.2018.06.125.
[10] Sven Boréna, Lisiana Nurhadia, Henrik Nya, Karl-Henrik Robèrta, Göran Bromana, Louise Trygg (2017), A strategic approach to sustainable transport system development – Part 2: the case of a vision for electric vehicle systems in southeast Sweden / Journal of Clearner Prodaction Vol. 140. https://doi.org/ 10.1016/j.jclepro.2016.02.055.
[11] Perebyynis V.I., Perebyynis A.V. (2006), Transportno-logisticheskiye sistemy predpriyatiy: formirovaniye i funktsionirovaniye: monohrafiya. – Poltava: RPTS PUSKA, 207 s.
[12] Pahomov R, Zyma O, Dyachenko E, "Analysis and Prevention of Industrial Injury in the Construction Sector", International Journal of Engineering & Technology, Vol.7, No 3.2, (2018), pp: 285-290. https://doi.org/10.14419/ijet.v7i3.2.14421