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Building Industry Enterprises Logistic System according to their Life-cycle and Organizational Adaptation

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Abstract

This article presents a survey of the Ukrainian machinery-building industry enterprises performance in 2012-2014 due to the state of their logistic systems development and companies' life-cycle stage. The review of existing theoretical approaches shows the range of possible criteria for evaluation at each level of the industry, enterprise and product. The conducted research evaluates the Ukrainian machinery-building industry and the companies that create that potential. The peculiarities of the organizational adaptation of the above mentioned enterprises and the developed recommendations will help to establish an adaptive management and gain enterprises' market competitiveness.

Keywords: machinery-building industry, logistic system, organizational adaptation, company's life cycle

Introduction

Globalization and integration of separate domestic markets into the international common market give the companies chances to search for competitive advantage not only in technological or economic spheres, but in organizational as well. The organizational adaptation ability of an enterprise can become the main power of implementing company's successful market strategies. Enterprise's goals, objectives and tasks differ from one phase of its development to another. Nowadays, the Ukrainian machinery-building industry as a sector of the country's economy suffers from a lack of investments and technological innovations. Managerial approach to the industry's current situation may help to investigate and find the organizational solution that can improve economic performance, generally.

Research issue

The aim of this article is to investigate the Ukrainian machinery-building industry enterprises in order to develop adaptive management recommendations to improve their competitiveness, by evaluating their logistic systems conditions and taking into consideration their life-cycle stage.

Literature review

There are several conceptions of the life-cycle approaches in the scientific literature. Different authors in different times took conclusions about the numbers of stages, their names, the criteria for assessment and the key factors of development. Three levels of analysis are presented by different authors. Generally, they vary from the controlled objective point of view, even if it might be an industry, an enterprise or a product (brand). The frequently mentioned classification and common-spread models in theory are summed up in table no.1.

There are some innovative crucial points for the life-cycle theory. From the point of view of Shirokova G. V. (2008), company's life-cycle stages are not consequential from one to another by time and development factors. It depends from the company's ability to adapt and react to market changes. So, adaptation can be used as a tool in order to endure one phase or quickly pass to another. One more significant feature is that company never plans its decline or liquidation, so after the maturity stage the renovations are needed to skip one phase and go on with new product launching or new structure creation.

Table no. 1. Life-cycle model approaches (Matushenko, 2010)

Implementa- tion level	Development key-factor	Name number and of stages	Evaluation criterion	Author
Industry	Barriers to entry	Stages (4): emergent, growth, mature and declining market	Competitiveness dynamics	M. Porter
	Technology improvement	Phases (3) of function; reliability; comfort	Consumers orientation	J. Moor
Enterprise	Organizational history – evolution and revolution inside the company	Phases (5): creativity, direction, delegation, coordination and collaboration	Growth rate of the industry, age of organization, size of organization, stage of evolution, stage of revolution	L.E. Greiner
Product	Consumer needs	Stages (4): launching, growth, maturity and liquidation	Market sales	T. Levitt

According to Morris et al. (1999), adaptation will be more beneficial in turbulent industries, than in stable industries. So, the stage of industry development has to be taken into consideration as well. Generally, four adaptation moderators can be observed in the scientific literature. The first adaptation intensity and necessity moderator is the maturity of the industry sector (mature, growth or emergent market). Second is the capital intensity (high and less capital intensive industries); third are the environmental circumstances changes and the fourth are the technical advance of an industry. (P. Andries, K. Debackere, 2007)

The main patterns of the company's organizational adaptation by its managerial performance are shown in the table no.2.

Table no. 2. Organizational design and company's strategic adaptation tiers (Carley, 1997)

<i>Criteria - Approaches</i>		<i>Focus</i>	<i>Cost function</i>	<i>Types of strategic adaptation</i>	<i>Definition</i>	<i>Organizational designs dimensions</i>		
Organizational learning	Evolution of industry	Socially shared cognition	Maximizing decision accuracy	Agent change	Individual agents could be hired or fired	Size of organization	Density	Number of isolates
						Organization	Planning	Maximizing the number of widgets produced
	Individual	Intelligent agents	Minimizing salary	General change	Both agents and linkages			
	Flexibility							

According to table no. 2, the focus of company's adaptation vary from socially-shared cognition on the level of society (Romanelli E., 1991); planning company's development on enterprise strategic level; implanting the intelligent agents (Holland J.H. et al., 1991) that would provoke market changes on tactical level to the everyday monitoring of internal and external flows (Ouksel A. et al., 1995) of enterprise on operational level.

Carley K. M. (1997) stated three types of enterprise strategic adaptation: agent change, linkage change and general change. They can be used due to the size of organization and the level of development of the mentioned moderators. The results of the research claimed that individuals who join large organizations are more likely to remain with the organization longer and to see the organization grow around them. As organizations become more successful, the individuals within the organization will come to interact less with other individuals within the organization (density decrease). Moreover, organizations that are increasingly successful will come to overlook fewer decision factors. (Carley, 1997)

Due to the survey of P. Andries and K. Debackere (2007), their findings suggested that the adaptation is beneficial in immature, capital-intensive and high-velocity industries. Adaptation appears detrimental in mature, stable industries. Adaptation has a more positive effect on survival. And to sum up, the effect of adaptation on survival is highly company and sector specific.

In order not only to have the theoretical view, but the possibility to investigate industry and enterprises states, the methods of actual life-cycle estimation should be taken into consideration as well. Matushenko (2010) mentioned five different approaches: method of building costs function - building correlation dependence from the company's revenue and total costs; method of turnover analysis - estimation of company's speed of turnover changes, break-even-point analysis; variance (dispersion) analysis – F - criterion calculation and comparison with table meaning; least square method - finding dependences between company's return and time, and financial indicators method based on the company's performance analyses.

Research methodology and the results of the study

Based on the presented literature review, the purpose of the research of the Ukrainian machinery-building industry companies' was

to find the resolution to increase the Ukrainian economy efficiency and the domestic companies' competitiveness.

Table no. 3. Ukrainian machinery-building industry data for 2012-2014 according to the Ukrainian companies economic activities classification (State statistics Service of Ukraine)

Industry	Volume of sold production (mln, hryvnas)	Industry production Index (%)		Summarized financial result before taxation (mln, hryvnas)		Net profit of enterprises that gained positive financial results (mln, hryvnas)	Share of enterprises that got financial losses during analyzed period (%)	
		2014	2013/2012	2014/2013	2013		2014	2013
Machinery building	93986.2	86.4	78.7	4986.5	-20045.0	8751.7	32.5	41.0
Personal computers, electronic and optic products production	7212.3	86.0	77.3	145.0	-1525.0	426.0	21.5	33.7
Electric machinery production	19306.4	91.1	100.1	736.9	-4487.1	1183.7	31.8	38.6
Machinery and equipment production that haven't been classified to other groups	29647.9	93.5	87.1	1200.1	-3490.7	3441.7	38.0	42.7
Vehicles, trailers and other transport production	37819.6	79.8	64.3	2904.5	-10542.2	3700.3	27.5	43.8

Table no. 3 presents data regarding the machinery-building industry indicators that states general declining of industry production index. The structure of produced items shows the maximum output in vehicles, trailers and other transport production (3700.3 mln. hryvnas) in 2014. At the same moment the share of enterprises that got financial losses slightly changes from 2013 to 2014. The dominant sector that suffered from financial losses in 2013 was the machinery and equipment production that haven't been classified to other groups and its losses rose up to 38% of enterprises' failure. In 2014, the loss-leader was the vehicles, trailers and other transport production (43.8%). It shows a high level of competitiveness inside this sector. The high intensity of business start-ups and low entry barriers made this sector the most attractive and the most risky in the machinery-building industry. The second place in 2013 was obtained by the electric machinery production (31.8%) and in 2014 by the machinery and equipment production (42.7%) that hasn't been classified to other groups.

The conducted research investigated the performance of 6 machinery-building enterprises in Kharkiv region by analyzing public data, managerial reports and insider information gained by a series of top-managers depth interviews in 2012-2014, in order to evaluate the level of their organizational adaptation, their internal and external flows, and the stage of their companies' life-cycle.

The analysis starts with the definition of the industry stage. We evaluate the machinery-building industry both by the entry barriers and the technology improvement factors. Table no. 3 data showed low entry barriers, high competitiveness and stagnation of industry, in general. Factors that make the industry parish are the lack of investments to improve technological base, high level of competitiveness within domestic and international market, ambiguity with taxation law and others. Due to the dynamics of competitiveness, the industry can be claimed as a mature one. Speaking about consumer orientation and technology improvement, the phase can be defined as a reliability phase. The adaptation intensity moderators should be taken into consideration, as well. So, the presented machinery-building industry can be defined as a mature, capital intensive, high-environmental circumstances changes and low technical advance.

The next step is to define the enterprises' life-cycle stages and their managerial peculiarities. The most appropriate method to use for the Ukrainian machinery-building industry evaluation is the financial

indicators method, because data for it can be taken from public sources. To take a conclusion about the life stage, we compare the company's income, their variable costs, break-even point, return on sales and turnover (Kostina G. P., Bashmakova M. M., 2003).

The results are presented in table no. 4. All the enterprises produce machinery-building widgets for domestic and international markets. The size of the studied companies can be defined as big, because of the total number of the employees that are higher than 100 for each enterprises. The organizational structure, general market strategy, peculiarities of organizing and maintaining companies' flows and the existence of logistic department had been scrutinized.

Table no. 4. Ukrainian machinery-building enterprises survey in 2012-2014

<i>Industry</i>	<i>Stage of industry development</i>	<i>Enterprise</i>	<i>Life-cycle stage</i>	<i>Peculiarities of organizational adaptation of logistic system (LS)</i>				
				<i>Organizational structure</i>	<i>Logistics department</i>	<i>Material flow management</i>	<i>LS management</i>	<i>Market strategy</i>
Machinery-building	Mature, medium capital intensive, high environmental circumstances changes, low technical advance	FED Corporation	Coordination	Linear function	+	Quality supply and production of raw materials	Only material flow is regulating	Coexistence
		Lozovaya Traktorodetal Plant	Collaboration	Linear function	+	Quality supply and production of raw materials	Only material flow is regulating	Cooperation

State Plant Turboatom	State Scientific and Producing Union Communar	Plant Electrotymash	Kharkiv Plant of Electric Equipment				
Delegation	Coordination	Collaboration	Collaboration				
Linear function	Linear function	Matrix	Linear function				
-	-	-	-				
Complex (total) raw materials usage	Quality supply and production of raw materials	MRP (material resource planning)	Rational transportation organization				
Narrow range of decision making specialists centralization	Only material flow is regulating	Informational flow coordination, low level of operating control	Logistic functions are distributed by functional departments				
Competitive	Coexistence	Cooperation	Cooperation				

The companies' performances evaluation gave the following results. The enterprise (State Plant Turboatom) that implements competitive strategies and is on delegation phase of life-cycle has as cost-function to maximize decision accuracy. The representatives of the group of coexistence market strategy (FED Corporation LTD, State Scientific, Producing Union Communar) are on coordination phase; they have to maximize as an aim the number of produced widgets and might implement linkage change. The members of the cooperation market strategy (Plant Electrotymash, Kharkiv Plant of Electric

Equipment and Lozovaya Plant Traktorodetal) implementation union are on an collaboration phase. They target cost function minimizing salary and improving their financial performance as an adaptation solution; they need to use general adaptation, which states for both changes in agents and linkage. So, the qualitative and quantitative further analysis is needed to investigate adaptive management of internal and external flows of the mentioned enterprises. It might give some more specific information and can become a factor of changing their life-cycle stage and market positioning.

Conclusions

Due to the conducted research, the results shows the maturity stage of the analyzed machinery-building industry. Five from the six scrutinized enterprises are either on collaboration or on coordination stages of their life-cycle. The study shows that companies' internal flows management refers to their external market strategies and for each phase the peculiarities of organizing and maintaining material flow reflect the general enterprise efficiency.

The gained practical results can be interesting for scientists and industry's companies' top-managers.

The future research is to investigate the level of development of internal and external flows of the mentioned enterprises and create a business model of machinery-building industry company's logistic system adaptive management.

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