

## **E-commerce in Activity of Trade Enterprises**

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**Abstract.** The article focuses on research, which combines implementation of e-commerce and efficiency evaluation in large size enterprises. The results of study, which discloses how actively large size enterprises are investing into e-commerce technologies, are presented herein. These results are presented on different levels. The new cash-flow model, which can be applied to evaluate efficiency when e-commerce technologies are used for trade, is presented in the paper. The profile of cash flows is applied to several case studies looking up for practical evidence. Large size enterprise from the same category, which for selling commodities is using e-commerce technologies, is compared with the enterprise, which for selling commodities is using traditional trade technologies. The study results show that large size enterprises are investing into e-commerce technologies more actively than medium size enterprises. Also results of the study show that the branches of large size enterprises are investing into e-commerce technologies more slowly than their main enterprises but, however, faster than medium size enterprises.

**Keywords:** trade enterprises, e-commerce, investments, economic efficiency, trade costs.

### **1. Introduction**

Modern economies are increasingly focused on the application of e-commerce technologies. The application of e-commerce technologies is opening up fundamentally new possibilities: favourable conditions for trade development in intermedium size markets are created; new business models are being introduced.

In the paper the attention is drawn to the fact that by examining opportunities

concerning the application of e-commerce technologies in business enterprises, there is a need to examine the activity of large size companies in this area. It is known that the role of large size enterprises is exceptionally important for the application of innovations (e-commerce technologies as well) in general, especially in the field of uptake of innovations.

On the other hand, successful and purposeful development of trade has to be based on such scientific knowledge of circumstances and scientifically-proved solutions, which are used to evaluate efficiency when e-commerce technologies are used. Trade expenditure, when e-commerce technologies are used, are usually lower than expenditure in traditional trade due to the fact that it is not necessary to invest into store equipment, employ people to work in traditional stores; however, there is a growth of expenditure which appears as a result of implementation and maintenance of e-commerce technologies and delivery of commodities.

The analyse of economic science literature (it was reviewed books published by Oxford University Press, Cambridge University Press, Harvard University Press, Springer, M. E. Sharpe, Routledge, etc.) shows, that the authors, which have published books about e-commerce, are using term “efficiency” quite rarely (around 7 % of them). However, only 0.12 % of authors, which published books about efficiency, have mentioned e-commerce technologies. The authors that published books on e-commerce topic have given attention to issues of large size enterprises much higher than the authors who have published books on efficiency topic. Such analyse shows the importance of researches in such area. One of such research is presented in the paper.

In this paper the application of e-commerce technologies in large size trade enterprises are examined and model, which can be applied to evaluate efficiency when e-commerce technologies are used in trade, is formulated, empirical assessment which shows that formulated theoretical model, can be applied, are undertaken.

The article is based on comparative, empirical, financial analysis, and discounted cash flow method.

## **2. The concept of e-commerce its reflection in scientific literature**

E-commerce is considered, as the employment of electronic networks for simplifying and expediting the purchase-sales process of commodities with the goal of reaching cost economy, conditional to greater business effectiveness (Šarapovas, 2005).

E-commerce is considered as a concept for trade based upon products and services that are being marketed, contracted, and paid for over the Internet (Bergendahl, 2005). E-commerce is associated also with ability to purchase goods through the Internet.

In the literature the concept of e-commerce is also analysed by Baršauskas and others (Baršauskas et al., 2008), Kraemer (Kraemer, 2006), Kvainauskaitė and others (Kvainauskaitė et al., 2005), Tan and other (Tan et al., 2007), Tucker (Tucker, 2008), etc.

Talking about e-commerce authors use term “e-commerce technologies” quite often.

E-commerce distinguishes some peculiarities: customers can get purchases delivered at home; trade expenditure, when e-commerce technologies are used, are usually lower than expenditure received in traditional trade.

Estimating the investments into e-commerce technologies, the funds of enterprise given for purchasing software and technological equipment have to be evaluated as well as funds for technologies guaranteeing a safe payment. Estimating the amount of money on advertisement Bergendahl (2005) found that enterprise, which was engaged in an activity and realised its commodities in stores before, have to spend less for advertisement than that enterprise which was not engaged in any activity. Bergendahl (2005) noticed that the need to give more money for advertisement exists until a critical mass of on-line customers is achieved (Bergendahl, 2005).

Enterprise decided to invest into e-commerce technologies in order to sell the goods to end-customers has also to invest into logistics solutions for the formation of smaller lots.

The survey of literature, which is published by leading world publishers (such as Oxford University Press, Cambridge University Press, Harvard University Press, Springer, M. E. Sharpe, Routledge, etc.), shows that there are 7.9 % of all scientific works (in total) on the topic of the application of e-commerce in large size enterprises. Comparing to the period of 2000-2005 the attention to the application of e-commerce in large size enterprises is increasing slowly.

Singh and others (2010) surveyed large size enterprises and find out that large size enterprises have local processes and local content of websites (Singh et al., 2010). Results of their survey showed that localization attitudes exist in 65 large size enterprises of Fortune 500. This means that usually it is a need to adapt the technology to affiliates located in different markets. It also means that by investing into e-commerce technologies affiliates also invest into local content of on-line stores.

In the case of large size enterprise the strategy for e-commerce technology transfer is formed by Mother Company seeking to spread the technology among its branches. Mother company may transfer information to branches using internal communication system, may get technology deployment agreement tailored to a group of companies, but can't transfer the license of technology to branches without the consent of the technology distributor.

### **3. The application of e-commerce technologies in large size trade enterprises**

In the second half of the twentieth century about 50 thousand of large size enterprises (usually applied in economically developed countries), which includes 300 thousand business - branch have been counted (Ginevičius et al., 2005). Large size enterprises, which are engaged in trading activities in Lithuania, have been substantially exceeded the indicators of medium size trade enterprises (Statistics of Lithuania, 2009). Between trading enterprises, which are located in Swedish and German, the highest proportion of firms, which apply innovations, belongs to large size enterprises (Eurostat, 2009).

Large size large size companies are enterprises mastering the most advanced technologies. Technological change is important in shaping the intermedium size competitiveness of such enterprises. Due to the immense intellectual and financial resources large size enterprises can accelerate the uptake of technologies. On the other hand the base of knowledge of the local subsidiaries is lower than knowledge of mother company (Martins et al., 2010). These involve mother company in providing knowledge and resources to its subsidiaries (Gammelgaard et al., 2011).

Based on Planet Retail database covering 2910 trade enterprises (in 140 countries of the world), an assessment is made how enterprises apply e-commerce technologies (Planet Retail, 2008). Studies revealed that 13 % of trade enterprises (377 enterprises from 2910 enterprises) apply e-commerce technologies.

Such results show that the development of methods which can be taken for the complex economic evaluation of the usage of e-commerce technologies in trade can be important.

Bellow the comparison of large size and medium size enterprises, which for selling commodities are using e-commerce technologies, is provided. Among the medium size enterprises 17 % of them use e-commerce technologies (74 enterprises of 440 enterprises). Among the large size enterprises 37 % of enterprises use e-commerce technology (111 large size enterprises out of 300

large size enterprises). Concerning the application of e-commerce technologies within the large size enterprises it is find out that 29.9 % branches of large size enterprises (303 branches from 1014 branches which belong to 111 large size enterprises) use e-commerce technologies. This shows that e-commerce technologies within branches of large size enterprises are absorbed more slowly than by mother companies. The results of the study show that large size enterprises use e-commerce technologies more intensively than the medium size companies, including uptake of e-commerce technologies within branches of large size enterprises.

On the basis of enterprises there are highlighted key cases devoted to the usage of e-commerce technologies in trade. It was observed that the costs structure of trade enterprises, which use e-commerce technologies, is different than in enterprises, which use traditional trade technologies. In particular, enterprises involved in e-commerce invest less in long-term tangible assets and employees less employees than enterprises, which use traditional trade technologies. The research was carried out in order to emphasize essential expenditure differences.

During research US statistical data was used. This data is collected by processing the material provided by the US institutions and the information collected by interviewing enterprises. Assessing data reliability, US Census Bureau (2009) considered that trying to guarantee reliability of 95 % survey, 4 % of permissible inaccuracy should be applied (US Census Bureau 2009).

It is noted that the overall trade enterprises, which for selling commodities were using e-commerce technologies (where were 14017 such enterprises in US in 2008 (US Census Bureau, 2009)), had 3.7 times fewer workers than enterprises, which for selling commodities were using traditional trade technologies (where were 639601 such enterprises in US in 2008 (US Census Bureau, 2009)).

It was also noted that enterprises, which for selling commodities were using e-commerce technologies, in 2008 had 3.1 lower investments into long-term tangible assets than enterprises, which for selling commodities were using traditional trade technologies.

This means that enterprises can achieve substantial changes in costs devoted to operations in trade when e-commerce technologies are used for selling commodities.

#### **4. Model, which can be applied to evaluate efficiency gained from investments into e-commerce technologies**

In order to calculate how much accomplished investment is covered by savings of operating costs. New cash-flow model was formulated and presented herein (Figure 1). The cash flows are defined as incomes and outcomes of cash and cash equivalents incurred during the period in the company due to specific its investments (Mackevičius et al. 2006).

The advantage of cash-flow method. Calculating the present worth of investments and savings, discounting is applied. The method is based on the fact that risk premium can be included into the discount rate. Although the method seems simple the difficulties arise when trying to justify financially the size of the discount rate, which is used during calculations.

The weakness of cash-flow method. In the process of discounting some factors such as inflation changes, the solvency of entity are not taken into account. These factors may also influence the money at the current value but during the discounting process they are not evaluated.

The cash-flow model is universal. This model can be applied when historic (real) and generated (expected) data is analysed.

The author made presumption that cash flows which are generated by investments of commodities seller in e-commerce or traditional trade are positive. This was proven also by contribution of Mora-Monge and others (2010) which provided evidence of the positive impact of e-commerce technologies.

In Figure 1 there is a new cash-flow model. In the section the means, for modelling commodities sellers' investments and results, have been offered. Herein, results before ( ) and after the usage ( ) of e-commerce technologies are measured. The investments of seller are seen as investments into e-commerce technologies (T), investments into marketing (R) and investments into logistics technologies (L). As 13 % traditional trade enterprises apply e-commerce technologies, investments into traditional trade (S) are included into presented model. Calculating the present worth of investment, discount rate (k) is applied. In the model  $\Delta NI_0^t$  is net present value of net income increase during the period  $t$ ,  $NI_0$  – net income before the application of technologies,  $NI_n$  – net present value of net income during  $n$  years,  $\Delta C_0^t$  – savings in operating costs received during the period  $t$ ,  $T_0^t$  – investment made during the period  $t$  into e-commerce technologies, present worth,  $L_0^t$  – investment made in logistics during the period  $t$ , present worth,  $R_0^t$  – funds

given for advertisement during the period  $t$ , present worth,  $S_0^t$  – investments made during the period  $t$  into traditional trade technologies, present worth,  $q$  – accumulation standard, assuming that net income ( $NI_0$ ) can grow gradually ( $q$ ),  $t$  is the whole analysed period, from the moment of investment beginning,  $E_t$  – economic efficiency after the period  $t$ .

In the enterprise, which has just invested in e-commerce, costs can be bigger, but it can decrease with the time. While costs decrease, there is a monetary return, which forms an appropriate economy of activity costs.

In the model various levels of economic evaluation are realised, the investments and the results reached by the deployment of e-commerce technologies. Presented model can be applied then in single enterprise traditional trade technologies and e-commerce technologies are combined, such was foreseen during the formulation of model.

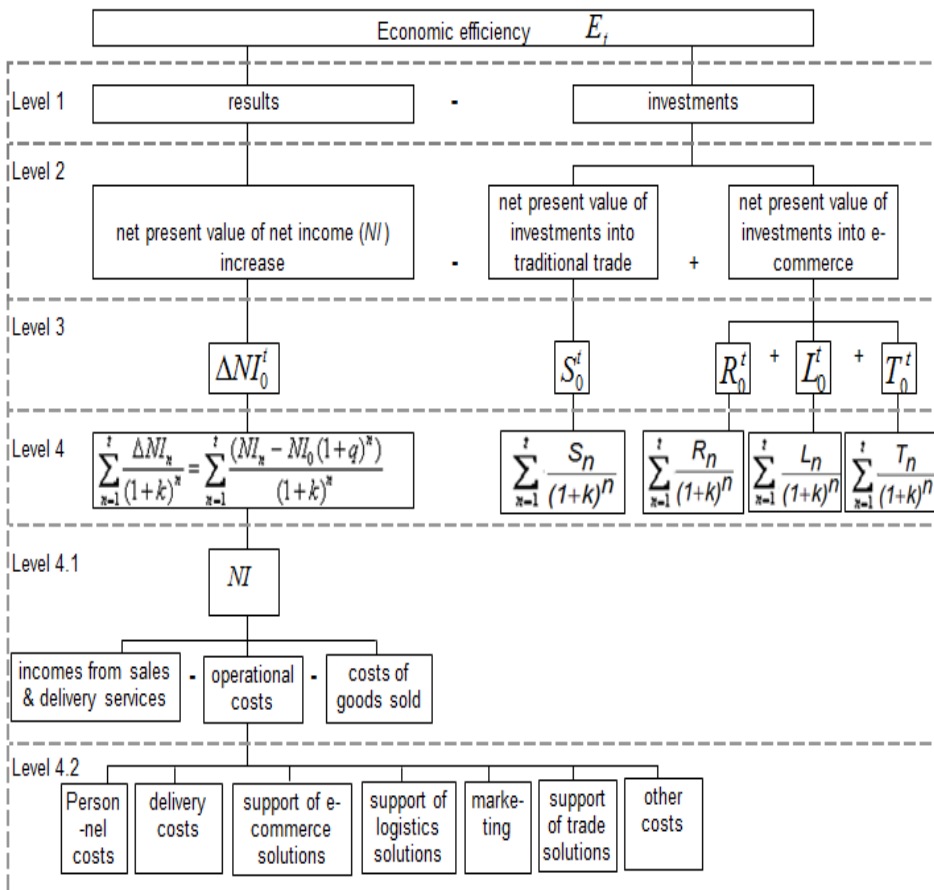


Figure 1. The model of cash flows, which are generated by investments into e-commerce (prepared by author)

Bellow the assessment of practical application of theoretical model has been provided. It is foreseen that the model can be used by enterprises, which sell and purchase commodities in trade or have such aim.

### 5. Empirical assessments of cash-flow model

Empirical assessments for proposed model are undertaken. By using cash-flow model large size enterprise, which for selling commodities is using e-commerce technologies, is compared with large size enterprise, which for selling commodities is using traditional trade technologies. For the comparison two US large size enterprises are taken: the first one is Amazon.com, the second one – Wal-Mart. 24.3 thousand employees are working in Amazon.com and 2100 thousand employees – in Wal-Mart. In 2009 the incomes of Amazon.com was



equal to 24.5 bln. US dol.; the incomes of Wal-Mart was equal to 405 bln. US dol. In the same year the ratio of sales per employee (productivity index) was equal to 0.99 in Amazon.com, to 0.19 – in Wal-Mart. This means that labour productivity was 5.1 times higher in Amazon.com. This shows that generally large size enterprises which apply e-commerce technologies have 5.1 times fewer employees than large size enterprises which apply traditional trade technologies only. The mentioned difference is very high in large size enterprises and is much higher than the difference within other enterprises (the difference is 1.37 times higher in large size enterprises).

Based on cash-flow model investment in e-commerce technologies and logistics involve funds, given for purchase of software and technological equipment. Based on Amazon.com (2009) data software is purchased every two years and technological equipment is purchased every three years (based on the usage duration of software and technological equipment) (Amazon.com, 2009). Calculating the present value 10 % discount rate ( $k=0.1$ ) is applied. Going into details about the funds given for advertisement, it is possible to state that this expenditure comprises the advertisement of Amazon.com (Table 1) by email, on the websites, etc. For the first 5 years Amazon.com was investing 8-14% of incomes to marketing. This means that after the first 5 years critical mass of customers were achieved.

Investment in traditional trade technologies involves funds, given to open new retail stores.

Bellow two large size enterprises are compared based on their economic efficiency, which is received due to their investments into different technologies. For the detail comparison of large size enterprises historical data of 15 years was taken.

Table 1. Evaluation of investments into e-commerce: Amazon.com case (The Wall Street Journal, 2009)

Model constrains	Markings	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Sum
Incomes from sales and delivery services (mln. US dol.)		16	148	610	1640	2762	3122	3933	5264	6921	8490	10711	14835	19166	24509	
Costs for delivery of commodities		1	15	49	115	124	136	151	193	234	280	317	449	508	696	
Personnel costs		2	13	49	130	218	235	287	342	364	411	506	644	796	948	
Costs for support of e-commerce solutions (16 %) (mln. US dol.)		0.4	2	5	18	18	21	25	27	29	32	34	25	34	33	
Other operational costs, except costs for marketing		4	25	76	222	309	334	342	417	540	675	737	1092	1458	1752	
Costs of goods sold (mln. US dol.)		13	119	476	1349	2106	2188	2789	3814	5085	6171	7938	11033	14388	18282	
Costs for marketing	$R_n$	2	14	57	151	235	138	125	123	158	198	263	344	482	680	
Investments into e-commerce technologies and logistics	$T_n + L_n$	2	10	34	113	110	130	156	167	180	200	211	156	215	207	
Net income	$NI_n$	-5	-25	-45	-195	-13	209	338	471	669	921	1179	1592	1982	2798	
Investments ( $n = 1, \dots, t$ )	$T_n + R_n + L_n$	4	24	91	264	345	268	281	290	338	398	474	500	697	887	
Net present value of net income increase (when $NI_0 = 0$ )	$\Delta NI'_0$	-4	-19	-31	-121	-7	107	158	200	258	323	376	461	522	670	2892
Net present value of investments	$T_0 + R_0 + L_0$	4	18	62	164	195	138	131	123	130	139	151	145	184	212	1796
Economic efficiency after 15 years (mln. US dol.)	$E_t$															1096

Comparing net incomes of Amazon.com and Wal-Mart it is found out that net income of Wal-Mart (Table 2) is 29 times bigger than net income of Amazon.com (Table 1). Comparing investments of Amazon.com and Wal-Mart it is found out that investments of Wal-Mart are 31 times bigger than investments of Amazon.com. Comparing Amazon.com net income with investments 0.62 ratio is received, comparing Wal-Mart net income with investments 0.83 ratio is received.

Comparing economic efficiency of Amazon.com and Wal-Mart it is found out that economic efficiency (after 15 years, measured in bln. US dol.) of Wal-Mart is only 10.7 times bigger than economic efficiency (after 15 years, measured in mln. US dol.) of Amazon.com.

Finally, it is calculated if-if scenario: if net income of Amazon.com would be the same as net income of Wal-Mart, investments could be calculated based on 0.62 ratio, then twice higher economic efficiency would be received. Such effect is received due to the fact that enterprises, which sell commodities online, have smaller expenditure than those, which sell commodities using traditional trade technologies. It has been established that Amazon.com receives the bigger economic benefit due to implementation of e-commerce technologies than Wal-Mart due to implementation of traditional trade technologies.

Table 2. Evaluation of investments into e-commerce: Wal-Mart case (The Wall Street Journal, 2009)

Model constrains	Markings	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Sum
Incomes from sales (bln. US dol.)			100	112	129	153	178	201	226	253	281	309	345	379	406	
Operational costs (bln. US dol.)			16	19	21	25	30	34	39	44	50	56	64	70	77	
Investments into traditional trade technologies		20	3	2	10	5	5	6	8	9	11	11	9			
Costs of goods sold (bln. US dol.)			79	88	101	120	138	157	176	196	217	238	264	287	306	
Net income	$NI_t$		4	5	6	9	10	10	12	13	14	16	17	22	23	
Investments	$S_t$	20	3	2	10	5	5	6	8	9	11	11	9			

Net present value of net income increase (when $NI_t = 0$ )	$\Delta NI_0^t$	0	4	4	4.3	5.4	5.4	5.2	5.4	5.5	5.6	5.5	5.4	6.4	6.0	67
Net present value of investments	$S_0$	18.1	2.7	1.2	6.7	3.0	2.7	3.0	3.5	3.8	4.4	3.7	2.7			56
Economic efficiency after 15 years (bln. US dol.)	$E_t$															12

Undertaken empirical assessment has shown that formulated model, can be applied to evaluate efficiency when e-commerce technologies are used in trade. Additionally, it can be stated that offered model, can be applied to evaluate efficiency when enterprises have investments into e-commerce technologies and/or traditional trade technologies.

## 6. Conclusions

The results of study, where large size and medium size enterprises are compared, show that large size enterprises use e-commerce technologies more intensively than medium size enterprises; that e-commerce technologies within branches of large size enterprise are absorbed more slowly than in the main enterprises but more actively than in medium size enterprises.

During the study it was also find out that that 13 % of enterprises which apply traditional trade technologies also apply e-commerce technologies.

The analysis of the application features of e-commerce technologies showed that enterprises can achieve substantial changes in costs devoted to operations in trade when e-commerce technologies are used for selling commodities. In general, enterprises involved in e-commerce invest less in tangible assets, and employ fewer employees. It has been established that generally enterprises which apply e-commerce technologies have 3.7 times fewer employees and 3.1 times less investments in long-term tangible assets than enterprises which only apply traditional trade technologies. During comparison of large size enterprises it is found out that in large size enterprises the difference concerning employees is even higher: large size enterprise which applies e-commerce technologies has 5.1 times fewer employees than enterprise which only applies traditional trade technologies.

For the activation of the usage of e-commerce technologies in trade, it is appropriate to apply proposed cash-flow model which helps to evaluate efficiency when e-commerce technologies are used by the sellers of commodities. In the model various levels of economic evaluation are released, the costs of implementation and the usage of e-commerce technologies, as well as – investments and the results reached by the deployment of such technologies have been analysed.

Undertaken empirical assessment has shown that formulated model, can be applied to evaluate efficiency when enterprises have investments into traditional trade technologies and/or e-commerce technologies. Additionally, the offered model can be applied for the evaluation of efficiency when e-commerce technologies are used in trade.

Using cash-flow model several large size enterprises are compared. Large size enterprise, which for selling commodities is using e-commerce technologies, is compared with large size enterprise, which for selling commodities is using traditional trade technologies. During empirical estimation, it has been established that large size enterprise receives the bigger economic benefit due to implementation of e-commerce technologies than due to implementation of traditional trade technologies (approximately economic benefit is bigger twice).

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