# DESIGNING A MARKETING INFORMATION SYSTEM BASED ON THE BALANCED SCORECARD

## Larisa Kapustina – Natalya Izakova – Andrei Drevalev

## Abstract

The aim of the study is to develop and test methodology for establishing a marketing information system of an industrial enterprise using the balanced scorecard. The authors suggest a functional structure of the marketing information system of an industrial enterprise adding supplier relations in addition to the four classic business development perspectives of the balanced scorecard. It is shown that the suggested methodology provides qualitative conclusions supporting effective marketing decisions. The study points out the option of using the balanced scorecard as a database for further analysis that can be carried out to identify the factors that influence the level of customer satisfaction and sales. The information base for the case study is comprised of internal documents of an industrial enterprise. Discriminant analysis and one-way ANOVA test are used to identify the factors that determine customer satisfaction level and its relation with the share of clients in total sales. Statistical calculations are performed with the use of the Statistical Package for the Social Science software (SPSS 20.0). The opportunities resulting from the suggested methodology can be used by industrial enterprises that need efficient management tools based on well-organized system of information flows.

**Key words:** marketing information system, balanced scorecard, ANOVA, discriminant analysis, customer satisfaction in industrial markets

**JEL Code:** M31, C38, C81

## Introduction and literature review

Efficient management of an industrial enterprise relies on the well-organized system of information flows within the organization. The task of establishing a marketing information system (MkIS) is important for companies operating in industrial markets because of the need to reduce risks and business uncertainty in production. Information is being constantly updated which leads to high costs of its maintenance and storing of a large amount of data. Such expenses can be unreasonable for an industrial enterprise operating with the shortage of circulating capital. The authors believe that establishing a MkIS for an industrial enterprise

based on the Norton and Kaplan's balanced scorecard (BSC) will provide an opportunity to create an information base aimed at implementing the organization's strategy as a whole, with due regard to peculiarities of the industry.

Scientific literature has numerous publications on the topic of MkIS. Thus, Sääksjärvi and Talvinen (1993) note that the MkIS has become a vital element of efficient marketing, planning and management. Talvinen considers that system integration is the main quality of MkIS. It allows specialists and managers of an organization to have timely access to relevant information (Talvinen, 1995). Kotler (2015) describes the development of MkIS structure through the company's internal accounting system, the system of collecting current external marketing information, market research and marketing information analysis system. The MkIS model suggested by DeLone et al. (2008) identifies two main factors of success: system quality and quality of information. According to the authors, information quality includes the forms of reports, studies, web pages, that make allowance for the purpose, nature, frequency and degree of use. Modern researchers emphasize the importance of common sense and the analysis system in MkIS for understanding the context of the market and the potential risks (Li et al., 2015). Mocean and Pop recommend overcoming the problem of information overdose by developing MkIS based on the preferences of users (Mocean & Pop, 2012).

Khodakarami and Chan (2013) note the need of an enterprise to create its own MkIS. It is emphasized that ready-made information systems available for purchase often do not take into account the expectations of users. Therefore, it is important to identify the factors that contribute to the efficient use of a company's MkIS.

Considering the peculiarities of MkIS of a Russian industrial enterprise, it should be noted that the MkIS is used to make decisions on all management functions, and not only on marketing activities. In this regard, MkIS should consider the features of the industry, as well as the needs of all departments and the staff of the company. The applicability of developing the own information system of an industrial enterprise is determined by the need for selection and systematization of the information that is specifically important for making marketing decisions. The article suggests that the end result of designing the MkIS would be a comprehensive accessible data system that assists in making well-reasoned marketing decisions and evaluating the efficiency of their implementation. The authors also define the criteria for collecting and structuring marketing information. The structure of the MkIS proposed by the authors enables evaluating the influence of marketing investments on the financial performance of an industrial company.

# 1    Selecting balanced indicators of the marketing information system

It can be considered, that the question of the criteria for selecting information and elements of the MkIS of an industrial enterprise is not sufficiently developed in the scientific literature. The authors propose to develop a MkIS of an industrial enterprise on the basis of a balanced scorecard (BSC) by Kaplan and Norton (2005). The BSC concept preserve the financial component as the main parameter of the managerial and business process; but at the same time, it strengthens the importance of the generalized integrated set of criteria that establish relation between the long-term financial success and the indicators of the client base, internal processes, staff and the work of the company as a whole.

Preissner (2007) develops this topic and suggests using the BSC in marketing and sales activities. Jeffrey (2013) also reviews key indicators that allow companies to evaluate the results of marketing activities, justifying marketing costs. He introduces the concept of data-based marketing. As a result of implementing these approaches, marketing indicators are not directly linked to the corporate business perspectives of a company. Therefore, the authors propose a combined approach: marketing information should be systematized by all business perspectives of an organization, and the choice of the metrics for each of the business development perspectives should provide for the use of indicators that take into account the peculiar features of the industry and marketing management based on relationship marketing.

Most scientists emphasize the increasing importance of consumers in the industrial market. Corporate clients act not only as buyers requiring an individual approach, but also as market actors who determine the value of the goods or services. The concept of relationship marketing involves focusing all business processes of the company on understanding and satisfying the needs of the customers, striving to involve the consumer in interactions. The use of marketing indicators enables assessment of the efficiency of the interaction with customers, which is relevant considering the need of the companies to control the marketing costs.

In order to evaluate the efficiency of marketing expenses, Rust et al. (2007) suggest considering the following parameters of the customer base: client awareness; uniqueness and stability of the qualities and privileges received by the client when using the company's goods or services; customer satisfaction; customer loyalty to company / brand; client experience. Kumar and Reinartz (2016) state that consumer value is a double concept that includes both the perceived value (PV) and the Customer Lifetime Value (CLV). Kumar et al. (2010) suggest using the Customer engagement value (CEV) as one of the main indicators of customer value. In order to be estimated, this indicator requires finding out how the buyer participates in the company's product life. Moeller et al. (2013) combine different approaches and consider the value of the client in terms of its role in Collaborative Value Creation (CVC). It is suggested

that the roles of customers in CVC can be identified through qualitative analysis, with the help of detailed interviews. This information could be used to analyse the views of the customers, their commitments and problems. The authors' choice of balanced indicators of an industrial enterprise marketing activities is presented in Table 1.

**Tab. 1: The choice of the balanced indicators of the MkIS for an industrial enterprise**

| Perspectives | Marketing Goals | Marketing Indicators |
|---|---|---|
| Finance | Increase in the level of consumption of products | Share of product in total revenue |
| | | Relative price |
| | Ensuring sales growth rates | Sales growth rates |
| | | Annual Recurring Billings (ARB) |
| Customer relations | Identification of target market segments and identification of success factors in target segments | Total number of consumers |
| | | Share of repeated orders |
| | | Frequency of purchases |
| | | Customer Satisfaction level (CSAT) |
| | | The index of consumer loyalty – Net Promoter Score (NPS) |
| | | Customer Retention Rate (CRR) |
| | | Customer Profitability (CP) |
| | | Customer Lifetime Value (CLV) |
| | | Consumer's share in sales |
| | | Share of new customers |
| Internal business processes | Orientation of internal business processes on the consumer, consumer relationships development | Customer Referral Value (CRV) |
| | | Customer Acquisition Cost (CAC) |
| | | Duration of interaction with the consumer |
| | | Customer Knowledge Value (CKV) |
| | | Customer Engagement Value (CEV) |
| Learning and growth | Staff Satisfaction | Employee Satisfaction Index |
| Supplier relations | Building relationships with suppliers | Duration of interaction with the supplier |
| | | The percentage of raw materials of the proper quality that came into production |

Source: own elaboration

In addition to the four classic areas of business development perspectives, i.e.: finance, customer relations, internal business processes, learning and growth – the authors have also included the perspective of building relationships with suppliers. Suppliers play a significant role in the industrial market, both in the process of achieving a certain level of the company's profit, and in increasing customer loyalty. The authors have selected indicators that can be used at all stages of marketing management activities for an industrial enterprise. The data for their calculation and analysis can be collected in timely and efficient way, which in its turn will provide managers with timely and valid results of the monitoring. In order to ensure the completeness of the reflection of the most important aspects of the MkIS of an industrial enterprise, the selected indicators are grouped together according to the business perspectives covering all areas of the company's activities. The indicators are, on the one hand, a result of

the marketing information analysis system and, on the other hand, a database of factors that influence the efficiency of marketing management.

## 2 Functional structure of the MkIS based on the marketing balanced scorecard

The functional structure proposed by the authors is based on the MkIS scheme by Kotler and the BSC by Kaplan and Norton. The authors have made an attempt to combine the approaches of the researchers mentioned here in order to emphasize the fact that MkIS incorporates evaluation of the effectiveness of marketing and implementation of business perspectives (Fig. 1). In such a way, it ensures well-reasoned marketing decisions. The input represents the set of information required for the calculation of selected indicators, the output of the marketing balanced scorecard (M-BSC).
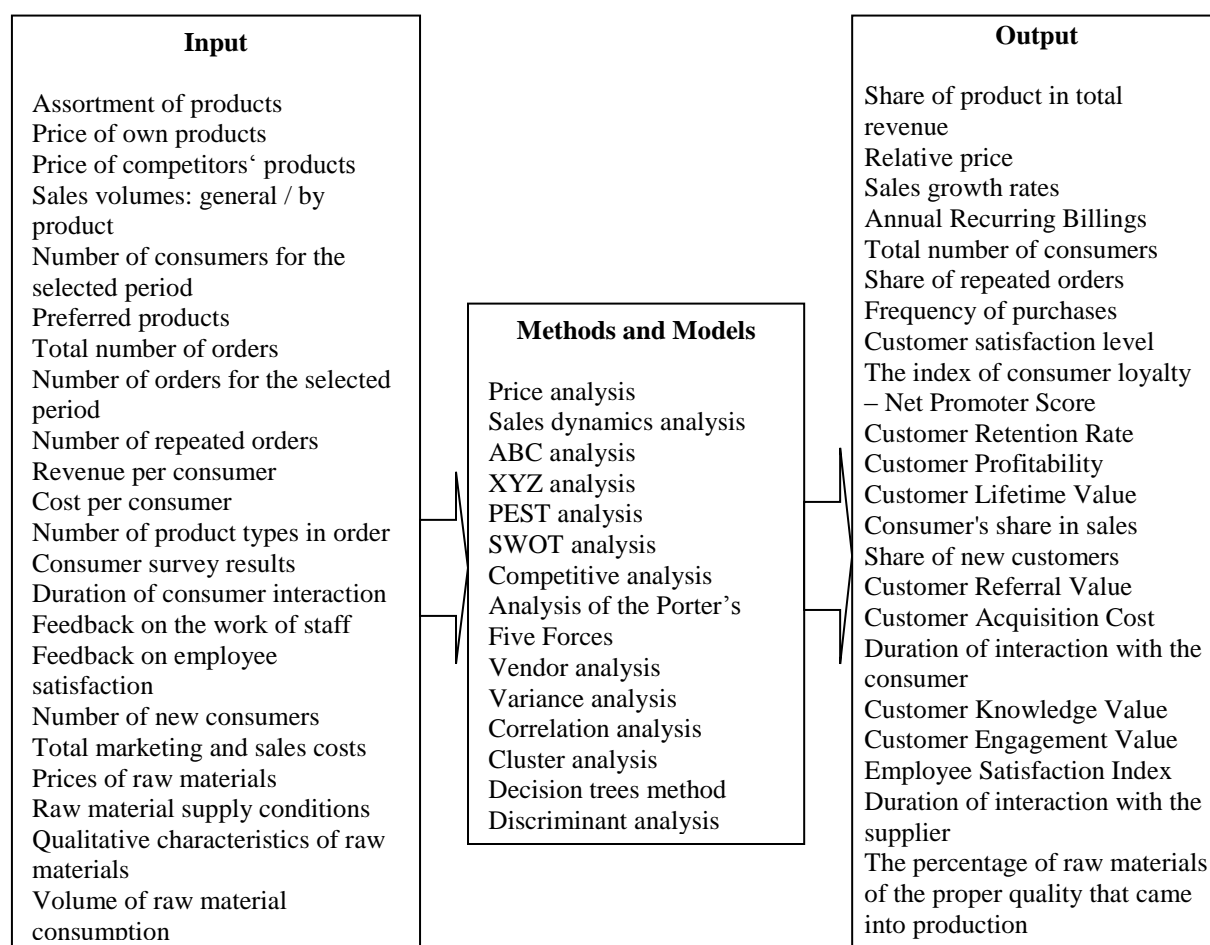
**Fig. 1: Functional Structure of the MkIS of an industrial enterprise**
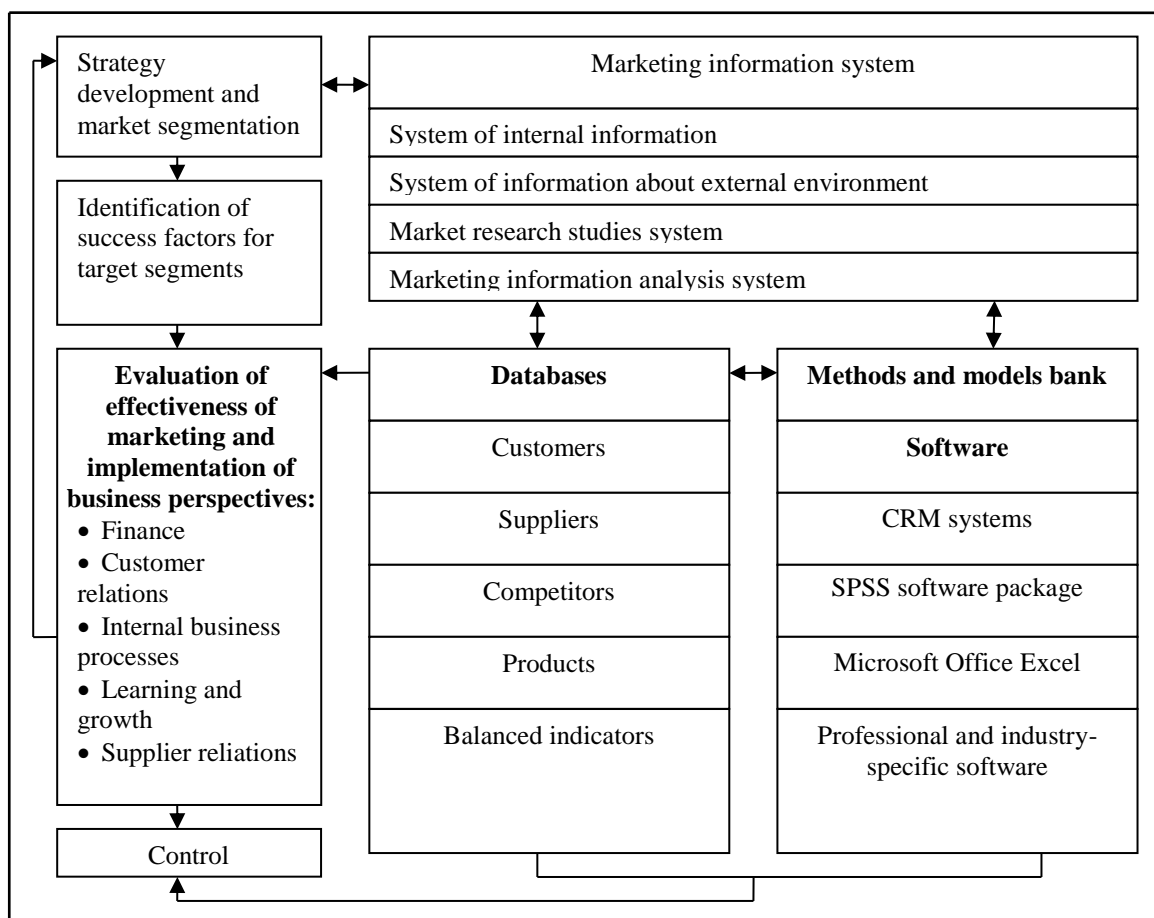


Source: own elaboration

Procedures and methodology of an integrated MkIS based on the BSC is presented in Fig. 2.

**Fig. 2: Procedures and methodology of the MkIS based on the M-BSC**

| Input | Methods and Models | Output |
|---|---|---|
| Assortment of products<br>Price of own products<br>Price of competitors' products<br>Sales volumes: general / by product<br>Number of consumers for the selected period<br>Preferred products<br>Total number of orders<br>Number of orders for the selected period<br>Number of repeated orders<br>Revenue per consumer<br>Cost per consumer<br>Number of product types in order<br>Consumer survey results<br>Duration of consumer interaction<br>Feedback on the work of staff<br>Feedback on employee satisfaction<br>Number of new consumers<br>Total marketing and sales costs<br>Prices of raw materials<br>Raw material supply conditions<br>Qualitative characteristics of raw materials<br>Volume of raw material consumption | Price analysis<br>Sales dynamics analysis<br>ABC analysis<br>XYZ analysis<br>PEST analysis<br>SWOT analysis<br>Competitive analysis<br>Analysis of the Porter's Five Forces<br>Vendor analysis<br>Variance analysis<br>Correlation analysis<br>Cluster analysis<br>Decision trees method<br>Discriminant analysis | Share of product in total revenue<br>Relative price<br>Sales growth rates<br>Annual Recurring Billings<br>Total number of consumers<br>Share of repeated orders<br>Frequency of purchases<br>Customer satisfaction level<br>The index of consumer loyalty – Net Promoter Score<br>Customer Retention Rate<br>Customer Profitability<br>Customer Lifetime Value<br>Consumer's share in sales<br>Share of new customers<br>Customer Referral Value<br>Customer Acquisition Cost<br>Duration of interaction with the consumer<br>Customer Knowledge Value<br>Customer Engagement Value<br>Employee Satisfaction Index<br>Duration of interaction with the supplier<br>The percentage of raw materials of the proper quality that came into production |

Source: own elaboration

The methods and models bank is an element of the functional structure of the MkIS. It aims at systematization, processing and analysis of information. The following tools can be used as methods of information processing and analysis: ABC analysis, XYZ analysis, PEST, SWOT analysis, vendor analysis, competitiveness analysis, analysis of Porter's Five Forces, as well as statistical methods. The regularity of information updates and indicators calculations and analysis depends on the type of an indicator and the market situation. The need to take the input parameters into account for the MkIS maintenance means that the M-BSC indicators are designed on the basis of the cause-effect relationships between different business perspectives which should be respected. Thus, several indicators may need the same information to be calculated. Therefore, the principle of information exchange must be observed when developing MkIS based on the M-BSC, taking into account the particularities of the information that will be required for indicators calculation, as well as the sources of this information, the frequency of collection, processing, analysis, and staff responsibilities concerning these functions.

Having the balanced indicators in the design of the MkIS, an enterprise will be able to assess impact of investments in marketing activities on the financial performance. It is important to establish information exchange between the business perspectives blocks in the framework of the MkIS, which will enable revealing the influence of each block on the final performance of the enterprise and, most important, its financial results.

# 3 Results of the customer relations perspective introduction into the MkIS of an industrial enterprise

The concepts of information exchange between business perspectives and the possibility of using balanced indicators as a database for further analysis were tested on the example of the Russian PVC profile manufacturer Adeplast, LLC.

An important indicator for the business perspective of "Finance" is the Annual Recurring Billings (ARB), which is calculated as the amount of income from all consumers of the company. The contribution of each consumer to the company's recurring billings can be estimated using an indicator related to the business perspective of "Customer Relations" – consumer's share in the company's sales, which is calculated as the ratio of the volume of purchases of the consumer to the total sales volume.

The authors have tested the hypothesis about the dependence of the sales volume of each client on its level of satisfaction. In order to measure the level of satisfaction, a survey was carried out among the clients of Adeplast. The sample consisted of 150 companies. Clients were asked to answer to the following question: "Are you ready to recommend our product to your partners, colleagues, acquaintances?". Those who chose 9 or 10 on a ten-point scale were considered satisfied loyal customers. The following data has been used as input: the company's sales volume, the volume of deliveries to the customer, the results of the consumer survey. Within the framework of the proposed MkIS structure, it is possible to assess the dependence of the client's share in the company's sales volume on its level of satisfaction with the one-way ANOVA test performed in the SPSS 20.0 software package.

The result of application of the Livin test with significance of p=0.000 showed the statistical reliability of the analysis. The ANOVA value indicator also equals zero, which indicates the statistical reliability of the differences in shares in the sales volume of companies with different satisfaction index (Fig. 3).

**Fig. 3: Dependence of client's share in total sales of Adeplast, LLC on client satisfaction**
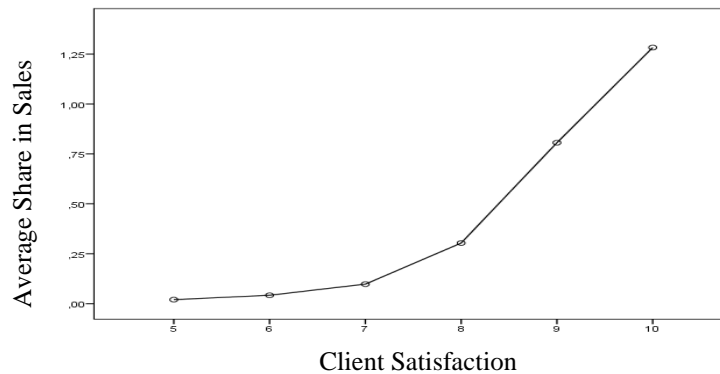


Source: own elaboration

Calculations suggest the conclusion that clients with a high level of satisfaction have the largest share in the total sales volume of the company and vice versa. Therefore, the contribution of consumers to the company's ARB actually depends on their level of satisfaction with the product and the process of interaction with the company. The presence of clients with low level of satisfaction and small share in the sales volume suggests that there are certain problems in interactions with a number of clients. Further analysis is needed to identify the reasons for that. For example, in-depth interviews with managers or the staff making the purchase decision. An important indicator of the efficiency of investments in marketing activities is also the growth dynamics of the number of satisfied consumers. Information on this indicator should be collected and analysed annually. Calculation and analysis of the indicators allows the production enterprise to identify customers to focus attention on, to develop cooperation with. This will help retain the customers with the largest share in the company's sales. The dynamics of the satisfaction indicator signifies the efficiency of relationship marketing and marketing programs: it can be considered efficient if the number of satisfied clients is growing or at least remains the same, as well as their contribution to ARB. The index of ARB and indicators of the "Finance" business perspective, including the share of the product in total revenue and the sales growth rates, are influenced by other indicators of the "Customer relations" business perspective. Therefore, it is important to organize a systematic information collection for analysis of these metrics.

## Conclusion

The purpose of designing a MkIS of a manufacturing enterprise based on a M-BSC is to organize an information flow that will allow managers to evaluate the effectiveness of marketing activities in financial indicators, take into account the peculiar features of the

industry and the strategy being implemented. The concept was tested for Adeplast, a manufacturer of a wide range of PVC profile products in the Ural region. The information was analysed by the authors in 2016. The authors see the advantages of developing a MkIS on the basis of M-BSC in the following opportunities for the company:

- to organize the collected information by objects and calculated indicators;

- to allocate resources for the MkIS based on objective requirements for the development of stages of M-BSC;

- to set clear time indicators for information collection;

- to represent and store information in the indicators comparable to the M-BSC, which will allow using software to process and analyse information;

- to eliminate duplication of information collection from various sources;

- to update the databases regularly to calculate the planned and newly introduced indicators.

The results of the case study show that qualitative conclusions can be made to support effective marketing decisions if MkIS of an industrial enterprise contains information required to calculate and analyse the balanced indicators of the company's business perspectives aimed at managing customer relations, and applying statistical analysis methods allow making.

## References

Jeffery, M. (2013). *Data-driven marketing: the 15 metrics everyone in marketing should know*. Moscow: Mann, Ivanov and Ferber.

Kaplan, R. S., & Norton, D. P. (2005) *Strategy Maps: Converting intangible assets into tangible outcomes.* Moscow: Olympus-business.

Khodakarami, F., & Chan, Y. E. (2013). An Investigation of Factors Affecting Marketing Information Systems' Use. *Journal of Marketing Development and Competitiveness*, 7(2), 115.

Kotler, P. (2015). *Marketing essentials*. Moscow: Williams.

Kumar, V., & Reinartz, W. (2016). Creating enduring customer value. *Journal of Marketing*, 80(6), 36-68.

Kumar, V., Aksoy, L., Donkers, B., Venkatesan, R., Wiesel, T., & Tillmanns, S. (2010). Undervalued or overvalued customers: capturing total customer engagement value. *Journal of Service Research*, 13(3), 297-310.

Li, X., Sun, Sh.X., Chen, K., Fung, T., & Wang, H. (2015). Design Theory for Market Surveillance Systems. *Journal of Management Information Systems*, 32(2), 278–313.

Mocean, L., & Pop, C. M. (2012). Marketing recommender systems: A new approach in digital economy. *Informatica Economica*, 16(4), 142.

Moeller, S., Ciuchita, R., Mahr, D., Odekerken-Schröder, G., & Fassnacht, M. (2013). Uncovering collaborative value creation patterns and establishing corresponding customer roles. *Journal of Service Research*, 16(4), 471-487.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. *European journal of information systems*, 17(3), 236-263.

Preissner, A. (2007). *Balanced Scorecard in marketing and sales*. Moscow: Grebennikov.

Rust, R. T., Ambler, T., Carpenter, G. S., Kumar, V., & Srivastava, R. K. (2004). Measuring marketing productivity: Current knowledge and future directions. *Journal of marketing*, 68(4), 76-89.

Sääksjärvi, M. V., & Talvinen, J. M. (1993). Integration and effectiveness of marketing information systems. *European Journal of marketing*, 27(1), 64-80.

Talvinen, J. M. (1995). Information systems in marketing: Identifying opportunities for new applications. *European Journal of Marketing*, 29(1), 8-26.

**Contact**

Larisa Kapustina

Ural State University of Economics, Marketing and International Management Department

62, 8 Marta Street, Ekaterinburg, Russia, 620144

Email: lakapustina@bk.ru


Natalya Izakova

Ural State University of Economics, Marketing and International Management Department

62, 8 Marta Street, Ekaterinburg, Russia, 620144

Email: izakovan@gmail.com


Andrei Drevalev

Ural State University of Economics, Marketing and International Management Department

62, 8 Marta Street, Ekaterinburg, Russia, 620144

Email: adrevalev@gmail.com