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The system of marketing information management: development, assessment, improvement

Abstract. The development of modern economy highlights the role and importance of information factor while making managerial decisions especially in the sphere of marketing activity of any organisation. Under such circumstances the problem of forming effective marketing information systems is becoming crucially important for Russian organisations. Marketing analysis is rather poor in modern Russian economy mainly because the history of Russian market economy is not so long and the analysis does not have enough bases of historical statistics data during the «new era» of functioning of Russian economy. Marketing information systems based on new technologies of processing and synthesising of information flows might improve the situation.

The current research is dedicated to solving the following tasks: to classify different kinds of marketing information at the enterprise; to define the marketing information system according to the authors' point of view; to elaborate the methods of assessment of the enterprise information supply and to create a model of effective marketing information system.

The research tasks represented in the article are aimed to elaborate some practical recommendations regarding information supply of marketing activities of industrial enterprises, namely: JSC «Tyazhmash», JSC «Uralmashzavod» and JSC «MK Ormeto-Yumz». Big industrial enterprises of the Russian Federation served as a practical platform for the analysis of the marketing information system. The authors have studied three enterprises of heavy-engineering from different regions and conducted the assessment of marketing information system for each enterprise in order to raise its efficiency.

Keywords: Marketing Information; Marketing Information Systems; Information Resources; Information Supply Management; Engineering Enterprise

JEL Classification: M31

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Управління маркетинговими інформаційними системами: розвиток, оцінка, вдосконалення

Анотація. Інформаційний фактор відіграє істотну роль при прийнятті управлінських рішень, особливо у сфері маркетингової діяльності організації. За таких обставин проблема формування ефективною маркетинговою інформаційною системою стає вкрай важливою для російських організацій. Нинішнє дослідження присвячено вирішенню таких завдань: класифікації різних видів маркетингової інформації на підприємстві, визначенню поняття «маркетингової інформаційної системи», розробці методів оцінки ефективності системи забезпечення підприємства інформацією та створенню моделі ефективною маркетинговою інформаційною системою. Ряд промислових підприємств РФ послужив платформою для проведення прикладного дослідження. Було дано оцінку маркетингової інформаційної системи кожного з досліджуваних підприємств і розроблено практичні рекомендації для підвищення ефективності забезпеченості цих підприємств маркетинговою інформацією.

Ключові слова: маркетингова інформація; маркетингова інформаційна система; інформаційні ресурси; управління забезпеченням інформацією; промислове підприємство.

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Управление маркетинговыми информационными системами: развитие, оценка, улучшение

Аннотация. Информационный фактор играет существенную роль при принятии управленческих решений, особенно в сфере маркетинговой деятельности организации. В данных обстоятельствах проблема формирования эффективной маркетинговой информационной системы становится крайне важной для российских организаций. Нынешнее исследование посвящено решению следующих задач: классификации различных видов маркетинговой информации на предприятии, определению понятия «маркетинговой информационной системы», разработке методов оценки эффективности системы обеспечения предприятия информацией и созданию модели эффективной маркетинговой информационной системы. Ряд промышленных предприятий РФ послужил практической базой для проведения исследования. Была дана оценка маркетинговой информационной системы каждого из исследуемых предприятий и разработаны практические рекомендации для повышения эффективности обеспечения данных предприятий маркетинговой информацией.

Ключевые слова: маркетинговая информация; маркетинговая информационная система; информационные ресурсы; управление обеспечением информацией; промышленное предприятие.

1. Introduction

The current state of the Russian market can be characterized by a lack of informational interaction between its main participants. The legislative framework which defines the criteria for information exchange and regulates the matters concerning access to economic information of market entities is not well developed. One of the key tasks aimed to stabilize the Russian economy and raise its competitive position at the world market is to develop information systems at various levels. Furthermore, the economic crisis has inspired a new round of competitive struggle, thereby accelerating integration processes and extending consumers' requirements because of the richness of the market. This situation makes the producers implement constant monitoring and analysis of the external and internal environment of the enterprise, assess the results of its activities, as well as the competitors' activity. It is impossible to implement such steps without applying an effective marketing information management system.

Specific characteristics of marketing information are the quick loss of its actuality, incompleteness and discrepancy of initial data which raises the necessity in a special approach to its processing and analysis. That is why work with marketing information requires the creation of a special management system. Such a system should allow to study this kind of information quickly and effectively to make effective marketing decisions. It should be mentioned that the process of formation of a special marketing information systems has to be a constant process because of constant changes in character and speed of information flows. It is urgent to install such a system into the united information management system of the enterprise.

2. Brief Literature Review

Information supply of enterprise functioning is an important task of modern economy, which is why it arouses special interest of scientists. The key research of the problems related to the development of marketing information systems have been studied by T. Ambler (Ambler, 2004); T. Mayor (Mayor, 2001); O. K. Oiner (Oiner, 2001); O. Tretyak (Tretyak, 2013); O. E. Pudovkina (Pudovkina, 2012); R. M. Usupov (Usupov, 2000) and many other researchers. Marketing information has its own place in the enterprise management system because its characteristics determine correctness and value of management decisions. The type of marketing information which can help to achieve the set goals should be defined at each stage on management process. Some approaches to the definition of marketing information and its constituents have been suggested by R. T. Rust (Rust, 2004) [8].

The use of the marketing information system as an information resource for managerial decisions has been studied in the latest research works. Some authors prove that in order to raise the efficiency of marketing information management the enterprise should design the corresponding management system [9-10].

3. The purpose of ongoing research is to elaborate theoretical and practical approach to integrated management of marketing information systems and the methods of assessment of specific character of information supply at Russian engineering enterprises.

4. Methodical basis of the research

The theoretical and methodology basis for this research is the fundamentals of economic theory, scientific concepts of the organisation and management theory, as well as research works of Russian and foreign scientists related to the problem of marketing information flows management. The methodical basis of the research is a system analysis used for forming and implementation of information supply mechanism and marketing information resource management. While solving the direct tasks, the method of scientific abstraction and generalisation, logical analysis methods, statistics methods, methods of observation and comparison, empirical description, the theory of management and decision-making, structural approach to system forming were used.

This research work offers the authors' approach to the assessment of the marketing information system including a proximate analysis of impact factors, a comprehensive analysis of its level and system development potential. It was based

on the diagnostics of complexity levels and the levels of dynamics in the external information environment of the enterprise, as well as on the analysis of basic indicators of its economic effectiveness and the assessment of the current state of marketing information management system of the enterprise. The latter is defined while studying the resource, information and staff supply of the enterprise both with regard to the assessment of its potential and the determination of its trends.

The complex study of the level and development potential of information supply system for effective marketing activity of the enterprise is to be implemented in three stages:

- the first stage suggests that monitoring of external information environment which influences the enterprise should be carried out;
- the second stage: the indicators of the enterprise's effectiveness are assessed and the current state of information supply system is analysed;
- the third stage performs the assessment of information supply system development potential with necessary proof for the priority development trends.

The first stage. An analysis of the external environment is supposed to be performed according to the assessment of its influence on the information field of the enterprise from the point of its complexity and dynamics. The most important factors which influence the marketing information system are to be indicated. The complex influence of complexity factors and the factors of environment dynamics is calculated on the basis of the integral indicator (Equation 1):

$$V = s \sum_{i=1} M_i \cdot k_i + r \sum_{j=1} P_j \cdot h_j \quad (1)$$

where V is the level of environment influence on the development of marketing information management system;

s is the weight indicator of the sum of the complexity factors of the environment;

M_i is the number of scores of i -factor of the environment complexity;

k_i is the weigh indicator of i -factor of the environment complexity;

r is the weight indicator of the sum of the dynamics factors of the environment;

P_j is the number of scores of j -factor of the environment dynamics;

h_j is the weigh indicator of j -factor of the environment dynamics.

The second stage. The monitoring of inner development potential of the enterprise is implemented. The results of this analysis allow us to make conclusion about the competitiveness of the enterprise, its production capacity and financial sustainability, everything that can influence the level of marketing information management system. The indicators used in the analysis of marketing information management system are divided into three groups: resource supply, information supply, and personnel supply. The integral indicator of the development level of marketing information management system is calculated by using Equation 2:

$$U = a \sum_{x=1} W_x \cdot t_x + b \sum_{z=1} D_z \cdot g_z + c \sum_{y=1} E_y \cdot l_y \quad (2)$$

where U is the level of development of marketing information management system;

a is the weight indicator of the sum of the resource group of factors;

W_x is the number of scores of x -factor of the resource group of factors;

t_x is the weigh indicator of x -factor of the resource group of factors;

b is the weight indicator of the sum of the information group of factors;

D_z is the number of scores of z -factor of the information group of factors;

g_z is the weigh indicator of z -factor of the information group of factors;

c is the weight indicator of the sum of the personnel group of factors;

E_y is the number of scores of y -factor of the personnel group of factors;

l_y is the weigh indicator of y -factor of the personnel group of factors.

The third stage performs the integral assessment of the development potential of the marketing information management system. It is performed on the basis of the matrix which unites all the analysed indicators. Each square of the matrix is described in the performed research work from the point of managerial decisions made in order to advance the development of marketing information management system.

5. Results and Problem Solution

5. 1. The broad classification of marketing information of an industrial enterprise

It helps to systematise the marketing information flows at the enterprise, to simplify the necessary data search and to make the resources in the data base and the knowledge base of the enterprise more formal. A classification of marketing information is based on the following characteristics: performed functions, stability level of the information flow, receiving period, data characteristics, sources of origin, territorial peculiarities, presenting time, processing level, scope of study of the analysed phenomenon, analysed time period.

The authors of the article took the definition of marketing information given by R. T. Rust (2004) as the basis for further research. Marketing information is a specific type of basic enterprise resources meeting all the demands connected with removing uncertainty of the receiver and used for marketing or other management activity in order to raise the effectiveness [8]. It has its own place in the enterprise management system because its characteristics determine the correctness and the value of a managerial decision. The type of marketing information, which can help to achieve the set goals, should be defined at each stage of the management process. To the authors' mind, it is necessary to classify and systematise marketing information in order to simplify the process of search for necessary data and to structure the sources of the data or knowledge base at the enterprise. This procedure will make marketing activity at the enterprise more effective. Thus, the authors suggested their own classification based on the following criteria: processing level, performed functions, receiving period, level of stability of the information flow, analysed time period, the scope of study of the analysed phenomenon, characteristics of data, sources of origin, type and territorial peculiarities.

The suggested classification of marketing information includes the most significant characteristics, however it can be extended taking into account various criteria according to the demands of the enterprise.

5. 2. Marketing information system can be defined as an integrated system of corresponding elements of marketing data bases and knowledge bases of the enterprise transforming marketing information and data into management information and knowledge resources

Some constituents of the marketing information system of the enterprise were grouped and the classification of marketing information systems was suggested. The classification is based on a complex analysis of external factors influencing the system and defining the key parameters of functioning and development of the system in its perspective development.

The marketing information management system is understood as a system of management which provides for procedures such as gathering information, its processing, analysis, systematisation, keeping and transmission of marketing information used to make managerial decisions aimed at raising the effectiveness of the enterprise's development. The marketing information system is the most effective instrument of marketing information management.

One of the most significant characteristics of the modern marketing information system is that it should produce new

knowledge being at the same time a complex organisational structure. Thus, it combines both active and passive elements. This feature allows us to achieve synergies. L. C. Giunipero, R. E. Hooker, S. J. Matthews and S. K. Brudvig (2008) consider that this effect appears when data processing is organised through marketing data bases and knowledge which determines the appearance of new information and knowledge resources for new knowledge [10]. The key elements of marketing information system can be grouped according to their functional use into the informational block, the technology and computer block, the program and methodology block, the organisational and legal block.

The research work proves the importance of the functional role of the marketing information system constituents, the number of basic components and the characteristics of its elements interconnection between its elements, which defines the specific character of the formation of the marketing information system at the industrial enterprise.

5. 3. The analysis of Russian industrial enterprises

To conduct this research, a short list of companies engaged in the development and production of unique technological products and technologies with their revenue of no less than 10 billion roubles in 2014 was prepared. We also used data received from SPARK-Interfax system (as of 30/03/2016), public sources and companies.

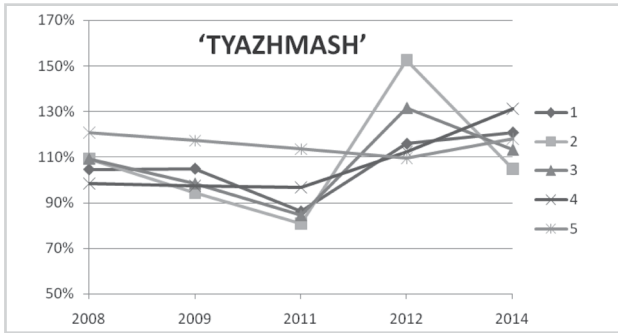
Heavy engineering enterprises were taken as the object of the conducted analysis, namely: JSC «Tyazhmash» from Syzran city in Samara region, JSC «Uralsmazavod» from Yekaterinburg city and JSC «MK Ormeto-Yumz» from Orsk city in Orenburg region. The marketing information systems of the enterprises were formed almost simultaneously in the period of 2010-2011. That is the reason why exactly the abovementioned enterprises were chosen. Another reason for choosing those enterprises was the scale of their activity and the volume of the market which was their target. The authors have chosen the leading corporations with their revenues not less than 10 billions of roubles.

JSC «Tyazhmash» manufactures products for such industries as power engineering, ferrous and non-ferrous metallurgy, building industry, chemistry and oil refining, gold-and-diamond mining and space industry. According to RBC (Ross Business Consulting Information Agency), JSC «Tyazhmash» is among Russia's fifty largest technology companies.

JSC «Uralsmazavod» is a leading heavy machine building company in Russia, manufacturing equipment for metallurgy, mining industry, etc. The company was established on the basis of «Uralsmazplant» (Yekaterinburg city) and a number of engineering companies in 2007. Total workforce of the corporation counts approximately 6,000 people. The volatile economic environment and the global market stimulate the company to come up with solutions applicable at every stage of mining and metallurgical production: from ore production to finished steel manufacture. The enterprise comprises an engineering department of its own and a number of shops, including welding, machine assembly and tool shops.

JSC MK Ormeto-Yumz» is a leading enterprise of metallurgical engineering and a leader in materials handling and production of blending equipment in Russia. Its production base includes: metallurgical production, welding fabrication, machine and assembly shop, rolls production, tool production etc. Today JSC «MK Ormeto-Yumz» is a manufacturing complex with its complete production cycle: from melting of metal to stock-produced mechanisms. This complex contains 25 workshops of basic and auxiliary production. JSC «MK Ormeto-Yumz» has its own engineering centre, steelmaking, foundry, press forging, welding fabrication, machine-and-assembly, tool production and rolls production.

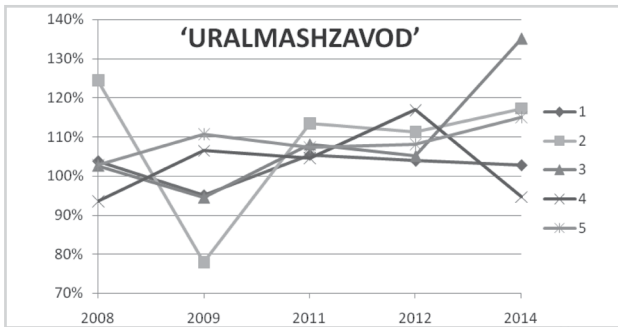
Within our approach, the first stage, an analysis of the external environment using technical and economic indicators' dynamics at the enterprises and its complexity was assessed. The results of the research have shown that the general changeability level of the environment influencing the enterprise is evaluated as low or average due to the specific character of the studied industry. The changes in basic indicators of the enterprises' development are shown in Figures 1-3.



Note: Main indicators analysed are: (1) – volume of production; (2) – cost of production; (3) – volume of sales; (4) – number of staff; (5) – average wages per month.

Fig. 1: Changes in technical and economic indicators of JSC «Tyazhmash»

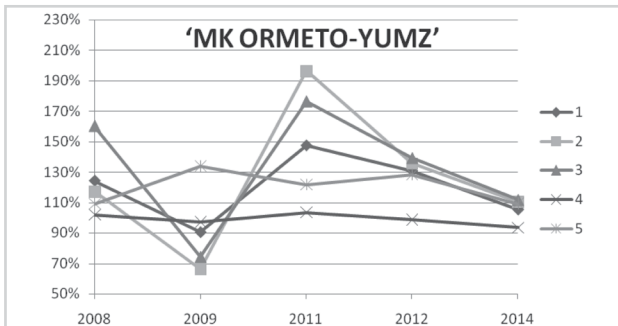
Source: Authors' analysis based at business data



Note: Main indicators analysed are: (1) – volume of production; (2) – cost of production; (3) – volume of sales; (4) – number of staff; (5) – average wages per month.

Fig. 2: Changes in technical and economic indicators of JSC «Uralmashzavod»

Source: Authors' analysis based at business data



Note: Main indicators analysed are: (1) – volume of production; (2) – cost of production; (3) – volume of sales; (4) – number of staff; (5) – average wages per month.

Fig.3: Changes in technical and economic indicators of JSC «MK Ormeto-Yumz»

Source: Authors' analysis based at business data

The results of the survey conducted among the enterprises showed rather high production, financial and economic potential of the studied enterprises, which allows developing updated information supply for marketing activity of the enterprises. However, the level of the development of the marketing information management systems happens to be not very high at all the studied enterprises.

At the second stage the monitoring of inner development potential of the enterprises was implemented and the integral indicator of the development level of marketing information management system was calculated by Equation 2. For JSC «Tyazhmash», $UT=3.61$, which is, according to experts' opinion, the average level of marketing information management system development. For JSC «Uralmashzavod», $UU=4.08$; and for JSC «MK Ormeto-Yumz», $UO=2.06$. Thus, the level of system development for JSC «Uralmashzavod» is rather high and for JSC «MK Ormeto-Yumz» is low. The results

of the survey related to the development potential for marketing information management systems are represented in Figure 4.

The research work shows the causes and factors that restrain the effective development of marketing information management systems of the studied enterprises. Each enterprise was suggested an activity aimed at the development of marketing information management system according to the position of the enterprise within the assessment matrix.

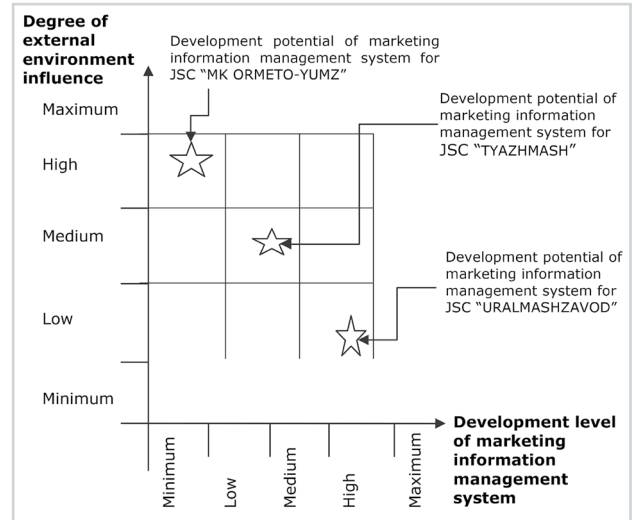


Fig. 4: Development potential for marketing information management systems.

Source: The authors' assessment of development potential of marketing information systems of the studied enterprises

5. 4. The model of marketing information management system was formed

The model includes the managerial decisions block, the monitoring block, the information receiving, systematization and methodical assistance module, the analytical assistance module and the expert assessment block.

The authors of the research have elaborated a model of formation of the marketing information system with a complex multilevel structure (Figure 5).

The methodical basis for the elaborated model is the decomposition of marketing functions, defining informational needs for each function, structuring and forming ways for the creation of data and knowledge bases, projecting marketing tasks decision methods and models, as well as finding out the most effective ways of their solution. The structure of the model should include expert modules and modelling complexes which are part of the software equipment. This will help to raise the efficiency of research activities of marketing departments of the enterprises. The analytical module includes basic sub-modules of the analysis of the external and the internal environment, as well as developing models of business processes of the enterprise.

The conditions of enterprise work constantly transform because of the influence of various factors and this causes the necessity of regular monitoring of the functioning process of the marketing information management system in order to find out whether it corresponds to general aims and tasks of the enterprise.

The decision support module combining informational and knowledge resources which are essential for decision making in the marketing sphere is an important element of the marketing information system.

The advantages of the elaborated system are the following: the system is universal and can be applied to solve different tasks; its module structure allows to form a system which is essential for the enterprise at its current development stage and to install only those blocks which are relevant to the practical needs of the users (managers) of the enterprise; data bases and knowledge bases designed for separate

categories and knowledge areas make it possible to analyze only the information necessary for specific marketing tasks; the system gives an opportunity to use the results of its functioning to solve of the tasks given to other departments of the enterprise. Thus, the marketing information management system suggested by the authors makes it possible to increase the effectiveness of managerial activity, to shorten the time required to make managerial decisions and to improve the quality and efficiency of information supply of the enterprise's marketing activity.

6. Conclusion

The analysis of activity results of some Russian heavy engineering enterprises has shown that the system of marketing activity information supply is not developed enough because of weak knowledge in theoretical, methodical, organisational and managerial aspects of its functioning. In order to solve this problem some theoretical and methodical basis of how to form the effective management system of marketing activity information supply should be created for Russian enterprises. The research work has come to the following results:

1. A classification of marketing information has been elaborated.
2. The authors have defined the marketing information system of the enterprise.
3. The methodical basis and the system of indicators have been elaborated in order to assess the information supply of marketing activity.
4. The updated model of marketing information system has been suggested for industrial enterprises.
5. Steps towards the improvement of information supply efficiency for industrial enterprises have been formulated.

7. Discussion

The importance of this research work results is in the use of the main points of this study to improve the methodical basis and raise the efficiency of the management systems which administrate information resources related to the marketing activity

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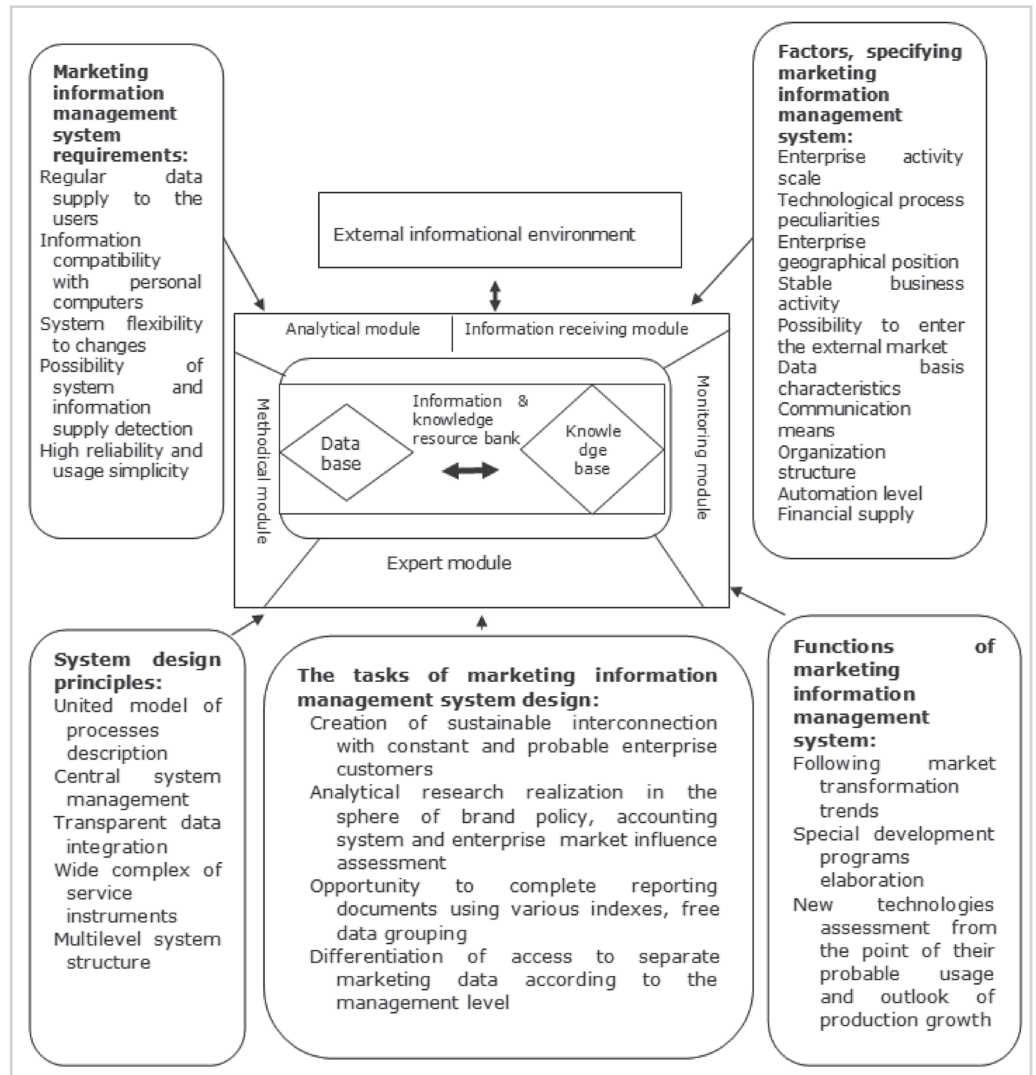


Fig. 5: The model of marketing information system of the enterprise

Source: Compiled by the authors

of the enterprise. The results of this research work may also be used as methodical instruments for the assessment of marketing activity information supply in order to define its effectiveness and development level. Furthermore, the suggestions described in the research work might be useful for middle-rank managers to organise events aimed at enhancing the efficiency of marketing information resources. This, in turn, may help to increase the competitiveness of the enterprise. The results of the research work make it possible to improve planning and control processes in the sphere of marketing activity of the enterprise. Further development of the research work may be done towards elaboration and realisation of innovative strategies of heavy engineering enterprises with the updated marketing information management system as the strategy basis.