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OPTIMISATION OF DATA MANAGEMENT SYSTEM: DEVELOPMENT OF REQUIREMENTS

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Abstract. The paper deals with the management of product information in a cosmetics retail and information interaction of a retailer with distributors and manufacturers. We developed a list of requirements for the types of information for a product catalogue. Using a survey and questionnaire of employees of the retailer, we determined what information the departments needed. We made sure that one standard to the structure of information did not exist and proposed our own scheme. Based on the survey results, we created a list of requirements for the information management system and proposed a scheme of system components. We conducted a comparative analysis of the costs of the company (about 2000 employees) for the salary of employees involved in entering information before and after the implementation of our system. For evaluation of the effectiveness of the integration of the developed system, we defined the cost indicators: PP, NPV and IRR.

Keywords: *Business administration; e-Commerce; Information and Communication Technology; Information Systems; Internal Organisation; IT Management, Optimisation; Retail.*

JEL Classification: C61, L22, L81, M15

INTRODUCTION

The global market for cosmetic products in 2017 was estimated at 532.43 billion US dollars. Even during strong financial downturns, total sales of cosmetics remain relatively stable (Artsimeyeva, 2018). The availability of in-house valuation of intangible assets is an integral part of the management system (Kosyakov, 2017). Only those organisations that are best able to adapt to market changes flourish (Tashmen & O'Rajli, 2014). We conducted an analysis of Russian cosmetics retailers and revealed the lack of a unified standard of data storage and exchange of product catalogues in this industry. This is the reason for the lag in the priority area – e-Commerce. Multiple duplication of information also increases the cost of servicing information interaction for all participants: retailer, distributor, and manufacturer.

The model of consumer behaviour at the moment is starting to form millennials. They are characterised by the path to buying, built around digital channels; these are people of the era of globalization, industrialization and the availability of digital technologies (Danilov, 2018). All methods of attracting customers and their

motivation to make purchases online were combined into a common e-Commerce sector.

The lack of optimisation of storage and data exchange is the reason for the lag in the priority area – e-commerce. Performance management is a continuous and flexible approach to the management of the organisation, which involves the most intensive dialogue among the participants (Kostrov, 2009). E-commerce and e-marketing involve getting close to customers, understanding them better and maintaining a dialogue with them (Andersone & Gaile-Sarkane, 2010). Thus, the need for the implementation of automated storage and exchange of information among participants is obvious.

In the context of market relations and competition, there are studies on improving the organisation management systems. There is no doubt that future socioeconomic developments rely heavily on big data and the related information technologies and methods (Choi, Wallace & Wang, 2017). The main emphasis of the system analysis in management is on the application of informatics methods in the applied field (Management Information Systems, Business Information Systems) (Anfilatov, Emel'yanov & Kukushkin, 2002). For accumulation, storage and transfer of data in each company it is recommended to use specialized hardware and software systems that provide reliability of storage and convenience of data input, output and processing (Almar, 2019).

Modern information systems are characterised by a complex structure and internal logic. To date, many methods and approaches have been developed for high-quality and optimal project of information systems, which allow for the development of modularity, dividing it into parallel processes and minimising the number of errors. The paradigm of object-oriented programming is most widely used (Kozlov & Shuykov, 2007).

The priority goal of any business is to make a profit and reduce costs. In this regard, it is relevant to use tools that contribute to the automation of production processes. The main projects are automated management systems for the organisation.

At the present stage of market development, it is required to implement automated systems that can provide effective management (Starikova, 2017). The generally accepted technological solution to constructing such systems at the moment is internal corporate computer networks that combine specialised servers and computerised workplaces of employees (or virtual corporate networks with remote cloud servers). Enterprises may also outsource their data processing to third-party service providers, but it brings about data privacy concerns (Cheng, Liu & Yao, 2017).

The key to effective operation of organisations is the stable functioning of information systems. The stability of a system's functioning is understood as its ability to perform its functions with the required quality under the influence of internal and external destabilising factors (Esikov, 2017). When implementing a system, it is need to determine its "borders", the managed (control object) and control (control subject) subsystems and the external environment (Mishin, 2003).

The required functions of the system are as follows:

1. Structure of separate components.
2. The interconnectedness of system components.
3. The hierarchy of system components.

The system is a certain set of interconnected elements that form a stable unity and integrity with integral properties and patterns (Korniyenko & Shindina, 2015, p. 7.). **Element** – indivisible part of the system characterised by specific properties that uniquely define it in the system. **Relation** – the complex of dependencies (unilateral or bilateral) of properties of one element from properties of other elements of the system. **Interaction –** the process of mutual influence (impact) of the elements, the system and the environment on each other. **External environment –** all that is not included in the system. A system is a group of interacting or interrelated entities that form a unified whole. **A system** is delineated by its spatial and temporal boundaries, surrounded and influenced by its environment, described by its structure and purpose and expressed in its functioning. Figure 1 shows a scheme of all system components.

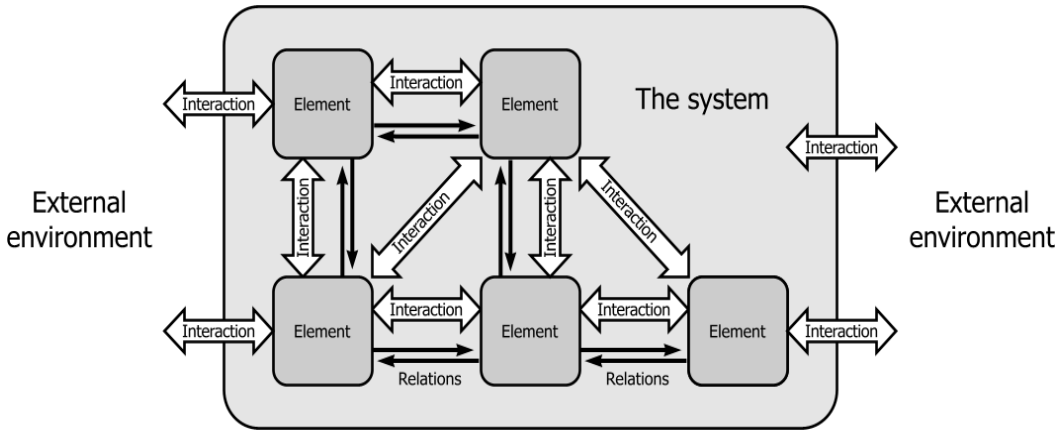

Fig. 1. Scheme of system components (authors' developed).

Queuing systems are designed to serve requirements. In the present research, various requests can serve as an example of requirements: for importing and exporting data, error messages, managing user accounts, individual products or their groups, etc.

The authors collected requirements for the types of required information (content) used by the cosmetics retailer. Further, based on the collected data, we developed an information management system on products sold by this retailer.

1. METHODOLOGY

The authors conducted an analysis of Russian cosmetics retailers and it revealed the lack of a unified standard of data storage and exchange of product catalogues in this industry. The authors decided to develop an information management system based on ready-made technical solutions.

In the beginning, we collected requests from all departments about the types of required information. Next, the authors standardised the data obtained and developed a list of product information requirements. Then the authors explored the possibilities of input, output, storage and exchange of these types of data. Afterwards, the authors created a list of system requirements and prepared the project schemes. In the final part of the research, we conducted a comparative analysis of the company's costs of employee salaries before and after implementation of the information management system. The authors defined the cost indicators: PP, NPV and IRR and determined the payback period of the project.

2. DISCUSSION

In conditions of market relations, research related to the optimisation of systems of organisations is of particular interest, such as specialised data services for managing data life cycle or electronic infrastructures. E-infrastructures are unified computing, storage, and network infrastructures (Koulouzis, *et al*. 2019). Information management systems have to support not only profitability, but also activities of individuals and groups allowing for effective cooperation among manufacturers, retailers and consumers (Charvat, Gnip, Gemtou & Vogeltanzova, 2010).

PIM system is a product of the information management system. Interaction with the PIM system can be one of the stages of business processes for storing and transmitting data both within the company and with external contractors. PIM system is a relatively new type of the content management system (CMS). Unlike other CMSs (most important are WordPress, Joomla, and Drupal) (Masner, Jarolimek & Kanska, 2018), PIM focuses on organising a product catalogue rather than on a website as a system of pages and modules.

The popularity of PIM systems is due to the development of e-Commerce and the increase in the number of online stores. Unlike classic retail, online trading cannot give the buyer the opportunity to examine the product in detail, pick it up, read the label on the back. Therefore, the need for a database where information about products will be organised in an understandable structure is actually required for each retailer (g2.com., 2018).

An important feature of PIM is the ability to work with information obtained from a wide variety of sources, for example, from excel tables, web sites, print catalogues, paper reports, etc. PIM not only stores multiform information created in various environments, but also performs its systematisation and reduction to a single standard, for example, how EDI (Electronic Data Interchange) uses one standard to structure the information (Gaile-Sarkane, 2008).

To reduce the complexity of the system, it is necessary to break it into small independent modules. A module is a group of system elements described only by its inputs and outputs. High degree of independence can be achieved using two optimisation methods: strengthening internal connections in each module and weakening the relationship between modules. The modular structure with the implementation of larger modules with the same number of inputs and outputs allows considering any complex system (Armstrong & Beron, 2014).

The authors developed the required system with maximum modulation:

1. Product catalogue.
2. The directory tree for the ability to edit a more important system without going down to lower levels of product information.
3. Digital assets management (DAM), a separate storage of media files: photos of products, logos and brand stories, image photos, video materials.
4. Import of large files containing information on hundreds of products.

Thus, all catalogue systems are independent of each other. It facilitates the use of the system, the search for errors, viewing versions of changes and any massive operations on clusters of products. Figure 2 shows a scheme of a PIM system with details on modules and the organisation of relationships between them.

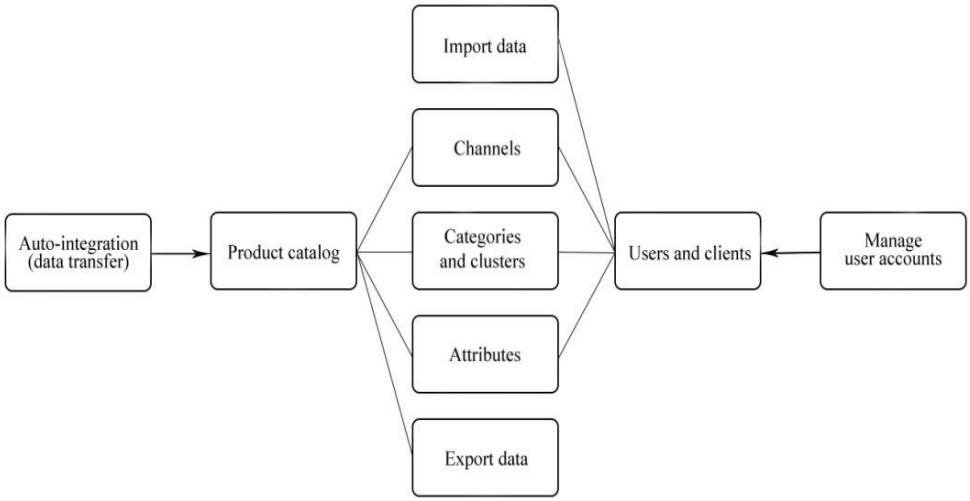

Fig. 2. The developed scheme of the PIM system (authors' developed).

A hierarchy is a structure with unequal relationships aiming elements, when influence in one direction is greater than in the other.

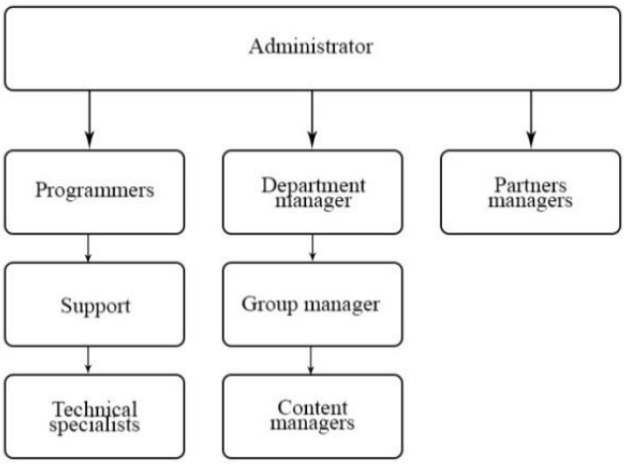

Fig. 3. Hierarchical structure (interoperability) of the PIM system (authors' developed).

In the PIM system, the hierarchical concept is used in the user access subsystem. Figure 3 shows all categories of users of the PIM system and the hierarchy among them. Users are divided into three clusters: technical specialists (programmers, support, testers); managers of the company; managers of partner companies.

Information System Requirements

To ensure information exchange and to optimise business processes, the system developed by the authors of the present research should include:

1. Data repositories (the so-called database) – uniform for the company and containing complete information on all products.
2. Operator interfaces that provide input and output of information in the workplaces of employees.
3. Accounts management system. Authorisation subsystem for these interfaces, which provides delegation of rights for reading and changing data (depending on the role and status of the operator).
4. Import and export of data, ensuring the exchange in an automated mode with similar systems of partners.
5. Access subsystem, providing delegation of authority to access certain data (depending on status of partner requesting the export of data).
6. Feedback system with instant automated delivery of messages to administrators or system operators: both from other operators and external sources or from consumers.
7. System may include also subsystems for automatic processing of input data, subsystems for checking integrity, quality of incoming data, etc.

Let us consider the components of the proposed system in more detail:

The selection and installation of the database and its management system (DBMS) are not fundamental problems. Currently, the IT market has many solutions that provide a variety of needs in an almost unlimited range of tasks and expected loads. Recently, a widespread technical solution is the rental of "cloud" data warehouses located in data centres and serviced by qualified staff. In ready-made systems, the database is already integrated and optimised for solving emerging problems.

Operator interfaces are usually implemented in the form of sets of html-pages in an internal computer network or applications at operator workstations. Often they include automated information entry tools: barcode scanners, devices for automated measurement of weight and dimensions, specialized photo equipment (for example, with a platform for creating 360-degree photographs).

The subsystem of authorisation and access control depends on the industry and company size. The subsystem is created and configured individually for each operator at company-owner. Large companies set up not only individual jobs, but also the roles and statuses of operators. Their combination creates a simple and flexible system of access to the system and defines a set of specialised interfaces.

It is impossible to give general recommendations for the type of interfaces and the distribution of rights to them (especially with regard to the technology of integration). They depend on the interaction schemes and the range of tasks. The

best solution is the method that has become the de facto standard for intersystem data exchange: transmitting an xml file of the established format over the Internet using standard communication protocols. The exact single file format, field names, permissible values and other requirements, the form for transferring images and video files have not been formed in the industry yet. However, given the growing need for establishing processes of data exchange, there is no doubt that it will be developed and adopted as an industry standard.

To reduce the number of errors, it is recommended to exchange data according to the scheme: issuing a file as a response to an incoming request, including authorisation data. This scheme, in contrast to possible alternatives, for example, generating a file with storing it in storage and subsequent downloading by the user, provides a minimum of transfer operations and maximum flexibility of use. For example, you can request only updates for relevance.

To protect data, it is recommended to transfer files using cryptographically secure protocols (https based on SSL or TLS) and/or in encrypted form using asymmetric or hybrid schemes of high cryptographic stability. To confirm authorship, it is recommended that the transferred files be signed with an electronic signature and saved as archives. An example of the need for authorship can be any claim of the buyer that entailed any proceedings.

Product Information Requirements

Responsibility for maintaining customer relationships falls on the shoulders of employees, who are responsible for providing services (Wu *et al.*, 2015). These employees can also adapt business process and service offerings to an individual customer (Chen *et al.*, 2019). Therefore, every employee engaged in the process of exchanging information with consumers (as with other departments) should have access to information at any time. Any information should be promptly and without distortion delivered from the system to the data consumer. The data required to organise sales in the cosmetics market are very diverse and diverse. Some of them, taking into account the specifics of the industry, are also critical for ensuring the choice and safety of the purchase.

Thus, only at the stage of retail sales the retailer needs the following product data:

1. Description of the product and its characteristics.
2. Weight, dimensions and quantitative data.
3. Data on conditions and shelf life.
4. Images, visualizations and multimedia materials.

We identified the following product information requirements:

From customers: by ingredients, method of use or storage. If the claimed description does not correspond to the actual one (change in the ingredients or a mistake), the buyer may receive skin damage, for example, burns or allergies. If the appearance of the product differs from the photo on the advertising modules, then the buyer will not be able to find it in the store, which will result in a drop in loyalty and negative reviews.

From company departments:

Purchasing Department: an incorrect description will affect the decision to purchase products or sales promotion (for example, 2 products for the price of one, but the shelf life is minimal and the buyer will not be able to use two pieces).

Analytical Department: an incorrect description of the products will affect errors in calculating the retail price and the predicted level of sales.

Digital and e-Commerce Departments: incorrect description will entail complaints and claims of customers, returns of products and a level drop of loyalty.

Logistics and Merchandising Departments: incorrect weight and size will affect the number of boxes for packaging or the product will not fit on the store shelf or in the box for online orders.

Figure 4 shows the scheme of requests to the PIM system: types of information and departments sending these requests.

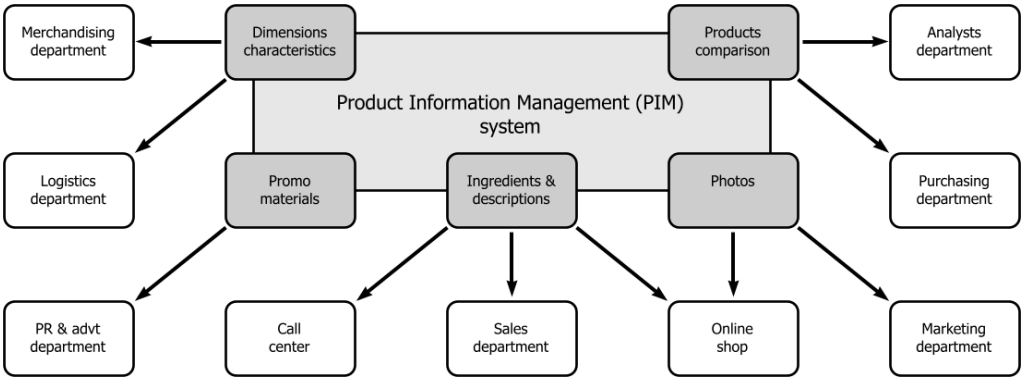

Fig. 4. Intracorporate scheme of information interaction (authors' developed).

Evaluation of the Effectiveness of the Integration of PIM

The authors implemented the PIM system in the business processes of the retailer. To calculate the effectiveness of the integration of the product information management system, average values taken from open sources will be used. Below we will consider improving the efficiency of the organisation of information exchange by comparative cost analysis in a medium-sized company (approximately 2000 employees).

One of the main functions of the PIM system is to fill the storefront of online store. Number of employees engaged in entering information – 6: photographer; retoucher; copywriter; content manager; account executive; purchasing manager.

Table 1. Average Salaries of Specialists in Moscow, Russia (authors' developed)

Specialist	Average salaries
Photographer	EUR 938
Retoucher	EUR 727
Copywriter	EUR 621
Content manager	EUR 677
Account executive	EUR 1370
Purchasing manager	EUR 1277

Table 1 shows the average salary of employees working at the online store in Moscow. Data were taken from the largest Russian recruitment company HeadHunter.ru. Prices are in euros at the rate of September 2019.

If the authors summarise the calculations, the amount of remuneration of employees involved in entering information is EUR 5610 per month.

Unfortunately, the cost of ready-made PIM systems presented on the IT market in the public domain is not available. Companies prefer to consider cooperation on individual terms. BrandQuad service works by subscription, tariffs start from EUR 2112 per month (Forbes.ru, 2018). We will operate with this value in the further analysis.

If all descriptions of products are entered by partners or suppliers (Almar, 2019), the company may refuse the services of all of the above employees (all manufacturers have information about their products). Instead, the company will hire a project administrator whose responsibilities include:

- Control of rules and deadlines for entering information;
- Support interaction;
- Checking spelling and punctuation in texts;
- Verification of photographic materials with technical requirements;
- Updating instructions;
- Advising of users;
- Training for users;
- Coordination of system updates, development of additional functions.

The average salary of a project administrator according to HeadHunter.ru is EUR 1126.

Thus, it can be argued that the company's savings after the integration of the information management system will be 5610 − (2112 + 1126) = EUR 2372 per month or EUR 28 464 per year.

The method of discounting cash flows is used for assessing the efficiency of the company. In our case, the model of the investment project is used, which is superimposed on the model of the existing company. The peculiarity of this scheme is that all funds invested in the system are evaluated as one-time costs.

The authors defined PP, NPV, IRR. The discount rate was calculated in accordance with an average cost of capital (WACC) model. Table 2 presents the results of calculating the effectiveness of the integration of PIM system in the retailer.

Table 2. Evaluation of the Effectiveness of the Integration of the PIM System over a Three-Year Period (authors' developed)

Index	Designation	Value	Criterion
Payback period, year	PP	2.74	Less than 3 years
Net present value, EUR	NPV	5230	Above zero
Internal Rate of Return	IRR	16.8 %	More than 15 %
Internal Rate of Return with the weighted average cost of capital	IRR-WACC	4.73 %	More than 4 %

Based on the results of calculating the cost indicators: PP, NPV, IRR, we can conclude that the efficiency of the organisation increased. The project payback period was less than 3 years.

3. RESULTS

The authors developed the product information management system based on ready-made technical solutions. PIM system is a relatively new type of content management system. We found that the lack of optimisation in the information exchange process is the reason for lagging in the priority area of e-Commerce. We developed a list of requirements for the types of information for a product catalogue. Using a survey and questionnaire of employees of the retailer, we determined what information the departments needed. We made sure that one standard to structure of information did not exist. Based on the received data, we developed an information management system.

The authors developed the information management system for optimisation of business processes, which should include:

1. Database.
2. Account system.
3. Account hierarchy.
4. The ability to import and export data.
5. The authorisation subsystem for these interfaces.
6. Feedback system.

The authors conducted a comparative analysis of the costs of the company (about 2000 employees) for the salary of employees involved in entering information before and after the implementation of our system. We calculated that the company's savings after the integration of the information management system would be 5610 − (2112 + 1126) = EUR 2372 per month or EUR 28 464 per year.

An analysis of the effectiveness of the implementation of the PIM system was conducted using the cash flow discounting method, which showed the following results:

1. The payback period of the project was 2.74 years.
2. The net present value of the project was EUR 5230.
3. Internal Rate of Return – 16.8 %.
4. IRR with the weighted average cost of capital – 4.73 %.

The authors can conclude that the implementation of the PIM system in the retailer increased the efficiency of the organisation.

4. CONCLUSIONS

It can be concluded that the implementation of the product information management system affects the efficiency of the company. The result of the implementation of the developed solution is the increased efficiency of information interaction among all participants (retailer, distributor, manufacturer), as well as optimised business processes and information interaction into the company's departments. Any company interested in the product information management

system can use our research. Thus, in the future, the PIM system may become part of the system-of-systems for managing all business processes of the company, along with customer relationship management and resource management systems.

REFERENCES

Almar, N. (2019). Theoretical underpinning and development integration of the PIM system into business processes of retail network. *IT&M Conference, Information Systems Management Institute.* p. 90.

Andersone, I. & Gaile-Sarkane, E. (2010). Information technologies as a tool for changes in consumer behaviour. *Management and sustainable development, 2*. Retrieved from http://oldweb.ltu.bg/jmsd/files/articles/26/26_Ieva_Andersone_Paper_2010.pdf

Anfilatov, V., Emel'yanov, A. & Kukushkin, A. (2002). *Sistemnyy analiz v upravlenii: Uchebnoye posobiye.* Moskva: Finansy i statistika. p. 368.

Armstrong, M. & Beron, A. (2014). *Upravlenie rezul'tativnost'yu: Sistema ocenki rezul'tatov v dejstvii.* Moskva: Al'pina Pablisher.

Artsimeyeva, D. (2018). *Mirovoy rynok kosmetiki v 2017 godu - stabil'noye razvitiye po vsem kategoriyam.* Retrieved from http://www.ruhim.ru/article/mirovoi-rinok-kosmetiki-v-2017-godu.htm

Brusakova, I. (2006). Sistema upravleniya bazami izmeritel'nykh znaniy. *Prikladnaya informatika.* Moskva: Sinergiya, *5*, 93–97.

Charvat, K., Gnip, P., Gemtou, M. & Vogeltanzova, T. (2010). Vision Statements and Road-Map Methodology for Knowledge Management Adoption. *AGRIS on-line Papers in Economics and Informatics*, *2*(4), 47–58.

Chen, R. R., Ou, C. X., Wang, W., Peng, Z. & Davison, R. M. (2019). Moving beyond the direct impact of using CRM systems on frontline employees' service performance: The mediating role of adaptive behaviour. *Information Systems Journal*, *30*(3), 458–491. https://doi.org/10.1111/isj.12265

Cheng, L., Liu, F. & Yao, D. (2017). Enterprise data breach: causes, challenges, prevention, and future directions. *WIREs Data Mining and Knowledge Discovery*, *7*(5), 1211. https://doi.org/10.1002/widm.1211

Choi, T.-M., Wallace, S. W. & Wang, Y. (2017). Big Data Analytics in Operations Management. *Production and Operations Management*, *27*(10), 1868–1883. https://doi.org/10.1111/poms.12838

Danilov, S. (2018). Millenialy menyayut rynok kosmetiki. Retrieved from http://brandpost.ru/millenialy-menyayut-rynok-kosmetiki

Esikov, D. (2017). Evaluating the effectiveness of sustainability problem solving methods of distributed information system functioning. *Programmnye produkty i sistemy*, *30*(2), 241–256. https://doi.org/10.15827/0236-235X.118.241-256

Forbes.ru. (2018). Toplivo dlya IT: rossijskij startap Brandquad privlek 187,5 mln rublej. / Fuel for it: Russian startup Brandquad raised 187.5 million rubles. Retrieved from: https://www.forbes.ru/tehnologii/372897-toplivo-dlya-it-rossiyskiy-startap-brandquad-privlek-1875-mln-rubley

G2.com. (2018). Best Product Information Management (PIM) Software. Retrieved from https://www.g2.com/categories/product-information-management-pim

Gaile-Sarkane, E. (2008). Integrated marketing and e-Commerce. *Ekonomichnij visnik NTUU KPI,* 2. Retrieved from http://economy.kpi.ua/files/files/55_kpi_2008.pdf

Jamshidi, M. (Eds). (2009). *Systems of Systems Engineering — Innovations for the 21st Century.* Wiley and Sons. https://doi.org/10.1109/ICIINFS.2008.4798321

Korniyenko, E. & Shindina, L. (2015). *Teoriya upravleniya: Uchebnoye posobiye.* Taganrog: S. A. Stupin.

Kostrov, A. (2009). *Osnovy informacionnogo menedzhmenta.* Moskva: Finansy i statistika, p. 528.

Kosyakov, M. (2017). *Marketing: ot obrazovaniya k professional'noj deyatel'nosti.* Moskva: Gosudarstvennyj universitet upravleniya.

Koulouzis, S., Martin, P., Zhou, H., Hu, Y., Wang, J., Carval, T., Grenier, B., Heikkinen, J., de Laat, C., Zhao, Z. (2019). Time-critical data management in clouds: Challenges and a Dynamic Real-Time Infrastructure Planner (DRIP) solution. *Concurrency and Computation: Practice and Experience*. E5269. https://doi.org/10.1002/cpe.5269

Kozlov, A. & Shuykov, S. (2007). Metody optimizatsii khraneniya i obrabotki ob"yektov v relyatsionnykh bazakh dannykh. *Nauka v obrazovanii, 10*. Retrieved from https://cyberleninka.ru/article/n/metody-optimizatsii-hraneniya-i-obrabotki-obektov-v-relyatsionnyh-bazah-dannyh/viewer

Masner, J., Jarolimek, J. & Kanska, E. (2018). Novel Approach for Creation, Storage and Presentation of Online Information Content. *AGRIS on-line Papers in Economics and Informatics*, *10*(3), 69–77. https://doi.org/10.7160/aol.2018.100306

Mishin, V. (2003). *Issledovaniya sistem upravleniya: Uchebnik.* Moskva: YUNITI-DANA.

Mori, M., Ceccarelli, A., Lollini, P., Frömel, B., Brancati, F. & Bondavalli, A. (2017). Systems-of-systems modeling using a comprehensive viewpoint-based SysML profile. *Journal of Software: Evolution and Process*, *30*(3), e1878. https://doi.org/10.1002/smr.1878

Popper, S., Bankes, S., Callaway, R. & DeLaurentis, D. (2004). *System-of-Systems Symposium: Report on a Summer Conversation*, July 21–22, Potomac Institute for Policy Studies, Arlington, VA.

Starikova, L. (2017). Vnedreniye sovremennykh tekhnologiy dlya upravleniya tovarnymi zapasami na torgovykh predpriyatiyakh. https://doi.org/10.15593/2224-9354/2017.4.23

Tashmen, M. & O'Rajli, C. (2014). *Pobedit' s pomoshch'yu innovacij. Prakticheskoe rukovodstvo po upravleniyu organizacionnymi izmeneniyami i obnovleniyami.* Moskva: Al'pina Pablisher.

Wu, Y.-C., Tsai, C.-S., Hsiung, H.-W., & Chen, K.-Y. (2015). Linkage between frontline employee service competence scale and customer perceptions of service quality. *Journal of Services Marketing*, *29*(3), 224–234. https://doi.org/10.1108/JSM-02-2014-0058

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