

STRUKTURALIZACJA SYSTEMÓW INFORMACJI MARKETINGOWYCH W ENTYJACH MEDYCYNICZNYCH

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Purpose: The aim of the article is to create a model of a marketing information system that will make it easier for medical entities to choose information/data that should be tracked and collected in the marketing sphere, which will consequently translate into the effective sale of medical services.

Design/methodology/approach: Literature studies, the document research method and expert knowledge, were used in the paper.

Findings: The work catalogs the main sets of information that should be collected in order to effectively manage the marketing area.

Practical implications: A model for structuring the marketing information system operating in a dental entity will help in collecting data necessary to make strategic, tactical and operational decisions regarding the marketing area.

Originality/value: A model for structuring the marketing information system operating in a dental entity.

Keywords: information system, marketing information system, dentist entities.

Category of the paper: Research paper.

1. Introduction

Entities providing medical services, like other business entities, must operate effectively if they want to stay on the market. This is conditional, among other things, on access to appropriate information at the appropriate time, place and form. Information reaching the company, both from the market environment and from the company itself, must be appropriately structured in terms of the functions and tasks of the system, the type of decisions made, and the structure of processes occurring in a medical entity, such as a dental office. A properly structured information system ensures proper ordering of the collection and subsequent use of information for decision-making purposes. A properly constructed system for generating, transmitting and processing data gives the company the opportunity to reduce uncertainty in operation and better adapt to dynamically changing environmental conditions.

The aim of the article is to create a model of a marketing information system that will make it easier for medical entities to choose information/data that should be tracked and collected in the marketing sphere, which will consequently translate into the effective sale of medical services.

2. Information systems in enterprise

The activity of the enterprise, including a medical entity such as a dental office, is aimed at achieving the goals set by it. It is believed that the primary goal of an enterprise is to strive to increase its value (Żurek, 2016). This goal is achieved through the skillful operation of the company in a competitive market, which contributes to increasing its market share, and in turn to increasing the book value of the company and achieving maximum profit (Wachowiak et al., 2006). Achieving the main goal results from the degree of implementation of auxiliary (partial) goals (Dołhasz, 2009). Partial goals are the result of the complexity of the company's structure, they are related to various areas of its activity, and therefore require detailed, individual assessments in terms of their place and functions in the company's structure.

However, in order to achieve these goals, access to full information on the state of the enterprise and its environment is needed, which will be used in the decision-making process (Żurek, 2016). Information is the basis for the functioning of every economic facility in the modern world. The concept of information is understood as a factor that increases knowledge about the enterprise and its environment. Information is defined as one of the most valuable management resources, which is the basis for both operational, tactical and strategic decisions made in the enterprise (Żurek, 2016).

For the efficient functioning of the enterprise, two sources of information are used (Nowicki, 2007):

- coming from the external environment - regarding, among others, the current legal status, political and economic situation of the country, introduced medical innovations, competition behavior,
- coming from the internal environment of the company - information regarding patient preferences, existing documentation (reports), business records, information from employees, and tests performed. Tables, figures and formulas – continuous numbering in the text.

However, in times of universal access to information, and even an avalanche of information flowing into the company, related to, among others, Due to the turbulence of the environment and the development of computerization, it becomes impossible for entities offering dental services to function on the basis of random, disordered or redundant information. In order to rationalize the circulation of data and avoid the so-called information noise, it becomes

necessary to organize a coherent system called the information system in which the following will be determined (Nowicki, 2007):

- information needs of users,
- ability to access appropriate sources of information,
- places of information selection and processing,
- time of information delivery, its scope and form adequate to the user's needs.

Managers and managers performing management functions expect information about specific characteristics, at a specific place and time, because the accuracy of decisions determines the efficiency of the functioning of a medical facility. The better the quality of information, the better the quality of decisions (Nowak, 2014). The quality of management information is determined by its functional features: completeness, availability, content, required form, selectivity, reliability, and degree of formalization. In theoretical approaches, these characteristics are summarized in the term "objective information supply". It means the amount and quality of information that limits uncertainty in management (Szałucki, 2017). Access to this type of data can only be provided to managers/managers of a medical unit by an individually tailored information system. We can talk about the existence of an information system in an enterprise when there is always a specific (more or less routinized) procedure for using data (in terms of collecting, processing and transmitting it). An information system is a set of rules, methods and procedures for creating, transmitting, processing and storing information for the purpose of managing an economic entity. The information system creates an information system responsible for efficient communication between individual internal units of the enterprise, as well as between the enterprise and its environment (Nowicki, 2007).

By information system we understand any and only such system that performs at least one of the following functions (Combs, 1995):

- generating (creating) information,
- gathering (gathering) information,
- storing (remembering, warehousing, archiving) information,
- transfer (transmission) of information,
- transforming (processing) information,
- interpretation (use, use) of information.

Typically, information systems perform several of these functions, and some perform all of the above functions. Their structure depends mainly on the purpose for which the information is to be served, as well as on the size and scope of the company's activities.

3. Marketing information system in enterprise

Information systems can be used in virtually all areas of a medical entity's business. The information system covers information processes of individual parts of the enterprise, which are separated due to the functions they perform. The variety of applications of information systems resulted in adaptation to the needs of a specific area of activity of a medical entity. Hence, we can distinguish information systems dedicated to specific areas of activity of an entity providing dental services. One of them is the marketing information system. Marketing activities are aimed at, among others: examining customer needs and satisfying them, while striving to achieve the best possible financial results of the medical entity (Bukowska, 2022). Marketing management is defined as the process of "planning and implementing ideas, shaping prices, promoting and distributing goods, services and ideas, aimed at leading to an exchange that meets the expectations of target groups of customers and organizations" (Kotler, 2012). In other words, decision-making problems arise in its sphere related to matching supply to demand (Andruszkiewicz, 2014). They include the processes of market research and shaping the market opportunities of medical entities, planning, shaping the forms of services and prices they offer, improving quality, creating exchange and satisfying the individual and collective needs of entities on the competitive medical services market.

The role of marketing in a company is to determine consumer preferences and satisfy their needs and ideas in such a way that the company makes a profit and the buyer is satisfied with the transaction (Mercer, 1992). In order to implement these tasks, the company must: select or define potential customers and the type of needs it wants to satisfy, conduct a detailed analysis of the preferences, desires and capabilities of buyers and the current degree of their satisfaction, taking into account the activities of competitors, plan an appropriate strategy for the composition of marketing instruments and implement appropriately shaped plans, organizational forms and using appropriate management and results control systems.

According to Ph. Kotler, marketing management is "the process of planning and implementing ideas, shaping prices, promoting and distributing goods, services and ideas, aimed at leading to an exchange that meets the expectations of customer groups and organizations" (Kotler, 2012).

Effective marketing management in an enterprise consists in proper programming of the structures of its individual elements, i.e. the structure of:

- services (quality, range of products, brand),
- prices (price list, discounts, commissions, additional costs),
- distribution (location, available patient registration channels, patient service),
- promotion (advertising, promotion, public relations),
- people,
- physical evidence,
- processes.

Today's marketing, however, uses a huge amount of information, not all of which is necessary and up-to-date. That is why their selection and skillful processing is so important, which is to be ensured by the introduction of a marketing information system (Ślusarczyk, 2020). The main goal of a marketing information system is to transform marketing data from various sources into information needed to make appropriate marketing decisions. The operation of this system is the result of learning about trends and directions of development of the environment (Ślusarczyk, 2020).

Information processed in the form of data must be properly structured and ordered, depending on the functions and tasks of the system, the nature of the decisions made and the structure of technological processes. In other words, they must create an appropriate structure, the basic components of which are information units and the relations between them, as well as procedures for their transformation (Mytlewski, 2007). Structuring helps in recognizing the structure of the problem, thus maximizing the amount of information that can be collected about a given problem. The less the structure of the problem is recognized, the more difficult it is to predict the system's behavior that would bring benefits (Majecka, 2003). Information is structured through information systems. The postulate of information structuring requires appropriate structuring of information systems. Structuring information systems is a process that determines the usefulness of information (Mytlewski, 2007).

Information structuring is intended to organize information (to isolate logical systems) so that it can be used by managers managing medical units. The structuring of the information system should be carried out by dividing the system into several interacting (interrelated) basic subsystems/components, each of which solves certain partial tasks, which will allow the adaptation of given subsystems/components to the requirements (needs) of their users, so as to provide them access to any cross-section of information that will help them find the most optimized solution (Combs, 1995).

Structuring the information systems of a medical entity ensures:

- access to high-quality information,
- providing information about changes and symptoms of changes as quickly as possible (the structure must include components that will allow controlling the environment and adapting to it), which is to ensure appropriate adaptation of the enterprise to the environment,
- completeness of the collection in relation to the user's needs (the supply of information coincides with the demand),
- reducing the time needed to make a decision to a minimum (thanks to shortening the time needed to complete and collate information, which allows you to focus on proper assessment and analysis),
- ability to fully integrate all spheres of the company's activity; merging the organization's components into one (integral) whole,

- common data set for different users,
- internal order in the organizational system, because the structure performs important regulatory functions,
- standardization of rules of conduct,
- relative balance of the system,
- reducing uncertainty in operation,
- possibility of testing the entire system.

Every company, including dental offices, uses sets of various information. They can be organized by using various types of classifications. Thus, using the place of creation of marketing information as a criterion, we can distinguish (Unold, 2009):

- internal information available in the company that produces it: the company's sales volume in terms of services and buyers (depending on what elements are needed in the decision-making process), level and structure of costs across services and buyers, enterprise potential.
- external information, available only within the environment of the company that uses it, i.e.: competitors' sales volume, size and cost structure of competitors, capacity of various segments, buyers' behavior on the market (including data on their patterns of behavior on the market, e.g. loyalty to the trademark, reaction to advertising and other means of marketing influence of the company, behavior before purchases, characteristics of behavior when purchasing), level and structure of buyers' income, market structure and degree of competitiveness, market entry conditions, conditions of the legal environment (competition regulation, legal aspects of decisions), conditions of the political environment (e.g. political stability of the country),
- information obtained from both sources: market share, share in the costs of servicing a given market, market position of the company, trust in the trademark.

Effective management of the marketing area would be impossible without a marketing information system (SIM) (Frąckiewicz, 2004). The basic feature of a marketing information system should be its usefulness for making marketing decisions. In addition to the basic function of providing marketing information, SIM should ensure an uninterrupted flow of information to all other field information systems and the management information system. This system cannot be isolated and work in isolation from other areas of the company's operation (Andruszkiewicz, 2014) Market decisions of managers of medical entities concern two main groups of variables:

- controlled variables that depend on the decision-maker, including primarily the company's tools for influencing the market,
- uncontrolled variables, including:

- variables that are not subject to the influence of marketing instruments (e.g. macroeconomic indicators of the country, average level of earnings in the region),
- variables that are, to some extent, susceptible to the impact of these instruments (e.g. market behavior of buyers, competition situation).

External marketing information plays a special role in making marketing decisions in an organization (Unold, 2009). Since the basic task of SIM is to "estimate information needs, process appropriate data and provide them at the right time to marketers", according to this concept, the SIM structure can distinguish interrelated groups of the following subsystems (Unold, 2009):

- information collection subsystem, which consists of:
 - operational information subsystem/internal company archives,
 - marketing "intelligence" subsystem,
 - marketing research subsystem,
- decision support subsystem.

The operational information subsystem aims to constantly collect information regarding current phenomena taking place in the enterprise. This system does not analyze the causes of specific phenomena, it only registers them, thus obtaining premises for making routine decisions relating to repeatable phenomena. Data is collected continuously, in the form of periodic reports, which include, among others: information on the volume of services provided, sales, prices, receivables, payments, liabilities, costs in various sections. This subsystem is usually based on electronic data processing. The marketing intelligence subsystem aims to obtain daily information regarding the development of the situation in the company's environment. This system collects information by reading books, magazines, attending trade fairs, and talking to customers, suppliers and intermediaries. The marketing research subsystem collects information for the purpose of solving specific problems occurring in medical units. It mainly provides data for making strategic and tactical decisions, as well as allows identifying the causes of changes in the levels of phenomena registered in the operational information subsystem. Marketing research includes, for example, advertising research (research on media, measurement of advertising effectiveness), economic research (short- and long-term forecasts, research on market trends, research on prices), product research (analysis of the strengths and weaknesses of own services and those of competitors, acceptance new product, research on competitors' products, testing existing products), market research (measurement of market potential, market share of main competitors, identification of market characteristics, structure and organization of distribution channels, economic factors and other factors affecting the dental services market), research sales (e.g. sales analysis, market tests) (Frąckiewicz, 2004). An enterprise providing medical services operating in accordance with the marketing concept satisfies buyers of its services, thus having a chance to achieve a competitive position and market success (Andruszkiewicz, 2014).

4. Marketing information system in dental entity

In today's socio-economic realities, the medical services market, including the dental services market, where an increasing amount of revenues generated by this market is covered by the private sector, has become a highly competitive market (www.pmmarketexperts.com). The increase in the competitiveness of the dental market results not only from the existence of an increasing number of private facilities, but also from the increase in patient awareness and changing expectations regarding the quality and availability of health services (Nadzkiewicz, 2018). Please remember that medical services are of a special nature. It is related to their subject (health, human life), as well as the role played by medical staff who decide about the patient's health. The specialist medical knowledge of a dentist is the basis for working with a patient, and the medical procedures he uses are the most important factors influencing the quality of health services (Majewski, 2022) Managing a dental office requires constant analysis of the environment and resources, attention to ensuring high quality health services and constant competition for the patient.

A dental office cannot create new quality without knowing the environment, recognizing its realities and trends, and quickly reacting to changes taking place there. The company does not operate for itself, but is included in the market, it must collect all kinds of information from it and process it appropriately and use it in the marketing management process to meet market needs, otherwise its competitive position will be threatened (Żurek, 2016). Appropriate organization of information also has an unquestionable impact on its ability to be used. Conducting marketing activities requires numerous analyzes of patient behavior, the effectiveness of promotional activities, the price level of medical services, competition, and the entire market. In order to implement these activities, however, reliable information is necessary - its collection, processing and transfer to managers who are able to use it to make not only marketing decisions, but also strategic ones from the point of view of the entire enterprise (Nowicki, 2005).

Entities providing dental services should therefore structure their marketing information system in such a way as to collect information needed to make marketing decisions:

1. from the external environment:

- 1.1. macroeconomic:

- regarding identified and programmed development trends of the sector and the economy (average income, general economic growth, inflation, interest rates and unemployment);
- socio-cultural including information on customs, habits, values and demographic features of the society in which the medical entity operates. They are important because they determine what services society will value the most;

- political and legal (tax policy, legal regulations (e.g. consumer protection law, medical regulations, GDPR), impact of the political situation on a given industry,
- 1.2. about the dental market:
- the condition of the dental sector,
 - changes in regulations and other formal and legal conditions for the operation of dental entities,
 - market size and characteristics by gender, age and income,
 - market shares of main competitors,
 - competitor prices,
 - types of services, new services,
 - types of marketing activities offered,
 - shopping trends, behaviors and needs of individual consumer groups,
 - quality of services provided or desired service qualities,
 - progress in medical technologies and techniques,
 - price analysis,
 - analysis of competitors, cooperators and intermediaries,
2. Coming from the internal environment
- 2.1. Information collected before performing a dental service (registered/collected on an ongoing basis):
- form of registration (by phone, e-mail, communicator such as Messenger, portal such as Znany Lekarz, Kliniki.pl, contact form available on the website, widget, in person);
 - if the patient is a first-time patient, information from where he found out about the clinic (Internet, blog, from friends/family, passed by the office, social media, advertising such as a banner, leaflet, etc. etc.);
 - what made the patient choose a given dental office (specific specialist, staff and quality of his education, price, positive opinions on Google, positive opinions of friends/family, referral from another doctor, location, wide range of services, wide range of services, equipment, medical equipment, e.g. availability of equipment, i.e. 3D tomograph, materials used, short waiting time, promotional activities, etc.);
- 2.2. Information collected after performing a dental service (registered/collected on an ongoing basis):
- information about clients/patients (number, age, gender, place of residence);
 - quantitative and value structure of the services provided;
 - value of revenues by doctors, by offices, and by type of service.

2.3. Information from assessments and analyzes performed most often once a month/week (Rzeźnicki, 2018; Rogala, 2014; Ostrowska):

- dynamics and structure of sales revenues (total, according to criteria, e.g. doctor, office, type of service);
- dynamics and cost structure of marketing activities;
- marketing costs per 1 new patient, share of marketing costs in generic costs and revenues, etc.;
- profitability of individual services, offices/chairs, doctors;
- assessment of the effectiveness of marketing activities (number of new patients, conversion rates, patient loyalty (number of regular/returning patients), effectiveness of discount/promotional campaigns, assessment SEO positioning, Google Ads sponsored links, etc. etc.);
- cost/effect analysis;
- number of first-time patients continuing treatment;
- the number of consultations/quotes performed and the number of dental services performed;
- the number of positive and negative opinions online, the number of complaints submitted;
- website evaluation; conversion rate - number of visits to the website, time spent on the website, number of returns to the website, number of clicks on the advertising banner provided on the website, number of clicks on the video on the website, navigating to subpages within the website, sharing further by the customer, e.g. article or product on social media;
- comparative analysis of service prices;
- number of new patients from individual marketing campaigns;
- assessment of patient preferences;
- short and long-term forecasts based on trend analysis;
- price and profit analysis;
- evaluation of the registration work (total number of calls, number of missed calls, number of patients registered for a medical visit, surveying the market, especially those undecided to make an appointment).

Nowadays, information collected in medical entities plays a key role in improving the quality of medical services provided. Such a structured marketing information system will support the dental office management staff in terms of supporting the process of research and development of dental services, supporting the process of creating and analyzing patients' needs, identifying opportunities to introduce new services, constantly collecting and storing marketing information, filtering and processing information, implementing communication procedures, providing premises for setting competitive prices, preparing promotional

campaigns, controlling the costs of marketing activities, providing data for analyzing the effectiveness of marketing activities, providing information for the process of preparing a long-term corporate strategy and supporting the process of selecting specific strategic goals and subordinated service strategies, prices and promotion (Unold, 2009).

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