CRM SYSTEM IMPLEMENTATION ACCORDING TO IT CAPABILITIES USING THE FUZZY AHP METHOD

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Abstract.

Research background: Communication with customers is based on CRM (Customer Relationship Management) systems in many enterprises. It is a sensitive matter with the necessary rules and recommendations. Customers are very smart and they have a very good orientation in market. Information technologies have the ability to support communication with customers, but the question is the optimal implementation for CRM.

Purpose of the article: The aim of this paper is to show the reserves in the support of CRM in the field of IT (Information Technology). The purpose of this article is to specify the weaknesses dedicated to implementation issues rooted in IT capabilities. The thinking is about an inspiring approach that has the potential to increase stability of CRM system implementation.

Methods: The method solution is based on a literature review of CRM and IT options, determination of the necessary metrics focused on automation support, database and data security, live chat integration, and method of implementation. Around 100 CRM systems were divided into four group according to the number of employees and evaluated on the basis of the fuzzy AHP (Analytic Hierarchy Process) method to expand the processing with issue of uncertainty.

Findings & Value added: The findings are based on the results of monitoring IT capabilities in CRM systems, and their final ranking in individual groups. There is stability to support of data security and automation. The differences are caused by greater interest in the live chat integration in group no 4 versus to group no 1. On the contrary, there is reduced interest in the implementation of methods and database rules. IT users do not have enough information about it directly from CRM system vendors; it is a pleasant simplification of way from business planning to training IT users based on using a chosen CRM system, but this approach is not transparent enough for proven implementation standards and many CRM projects have difficulties with it.

Keywords: *CRM; changes in society, implementation; information technology; knowledge*

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1 Introduction

Information technology (IT) has an increasing place in business processes. From the role of a supporter of processes with regards to the requirements for timing, quality, and large volume of data, it is a necessary to support daily activities and the possibility of their operation in a virtual space. The pandemic crisis has created new limits for the necessary conditions for live and work. It is natural to expect IT to be in very good condition, as digitization and the influence of artificial intelligence have been more visible since the beginning of this century. The question is whether it is acceptable enough to replace traditional ways of cooperation and meetings.

The same question is important for customers. Customer relationship management (CRM) is a group of IT applications (systems) that is responsible for customer care. The customer is the most important value for any business because it is the source of income to have the financial sources to develop the business. Customers had limited shopping conditions. There were restrictions on the number of people to be together, some shops had to be closed or sales time was limited. Many customers still use alternative ways of shopping through e-shops. In many cases, these e-shops are directly connected to CRM systems.

CRM industry was and still is very dynamically developed area. Revenues are estimated to reach more than $ 80 billion by 2025 (Taylor, 2021). There is great interest in mobile CRM (65% of enterprises use mobile CRM), variability of access from different devices (81% of IT users use different devices such as desktop, laptop, smartphone, and tablet), cloud architecture solution (87% of enterprises use cloud CRM). Among the CRM processes offered are customer service, channel management and call center, knowledge management, marketing and sales force automation. Based on these numbers, it is to be expected that CRM technology must respect the real requirements and capabilities of the business. The question for this paper is whether information technology is implemented at the maximum level of ability to support business in dramatically changed conditions. For an effective solution to this topic, the paper is divided into several chapters, where Chapter 1 is devoted to the introduction and literature review. Chapter 2 contains information about the adopted method solution and the necessary data, Chapter 3 is focused on processing based on the fuzzy AHP (Analytic Hierarchy Process) method, and Chapter 4 presents the achieved results with a discussion. There is also a conclusion and references mostly from 2020 to 2022.

1.1 Customer Relationship Management (CRM)

Today's customers have a very good orientation in the digital space. They use web browsers, Google search, social networks and others specialized information systems to know the necessary information about the required goods. Analyzes have shown that approximately 87% of consumers use online search information before purchasing and spend approximately 79 days to collect information before actually purchasing (Alaimo, 2018; Kumar & Iyer, 2019). These searches are monitored by CRM systems in order to determine the interest in the offered goods and services. In many cases, searchers (potential customers) have the opportunity to chat with marketers, salespeople, or through guide in the form of artificial intelligence, and personalized marketing is needed (Eng et al., 2020). All information is stored to contain data

to create a 360-degree view on customers (Sheng, 2020;   Zeleke & Kumar 2019) who are connected.

Information technology is a great helper in supporting the first contact with the customer. It is the basis for answering the initial questions about goods. Information technology uses artificial intelligence, automation processes, and templates to share instructions according to common recommendations. Customer relationship management has an irreplaceable place here, from opulent enterprises to small business; contacting customers is a responsible task and the right and variable ways (tools) help to facilitate the conversation between the customer and the enterprise (Lund & Pulizzi (Foreword), 2018; Sangode & Sujit, 2019). In a highly competition society, it is important to offer communication with customers with optimal support through CRM systems in the preferred style of communication (Zsako, 2018;   Muhammad, Muhammad Bello et al., 2018). The reason is that contact with customers brings a number of situations, and the aim is to avoid a negative situation as much as possible. Existing customers benefit from using customer profiles with stored data about preferences and basic information such as name and address, previous conversations, or links to information about past purchases. Clear communication increases the potential for resale (Rodriguez et al., 2018) and brand confidence.

During and after the pandemic crisis, public rules for communicating with customers are still important. It is the empathy and respect (Cosgrave & O'Dwyer, 2020; Nguyen & Kieuthi, 2020) to communicate that the customer is not disappointed. Good advice is provided by the CARP method (Bacal, 2020). This method provides advice to manage the conversation, learn from the situation, focus on the main topic to solve a problem that the customer is satisfied. Such communication with the customer requires optimal timing and the right way for marketers and salespeople to communicate closely with customers (Bonney et al., 2020; Kumar, 2017). For them, it is necessary to check whether the communication continues until it is correct, and the customer decides that it is correct. It is an initial requirement that customers need a communication such as with a real person. This approach is highly valued in the virtual space that the customer feels unique. In fact, customers prefer real face-to-face communication. They need the default way of shopping through contact with marketers and salespeople when choosing goods with their own hands with a discussion of possible variants. The first is about positive language, which is essential for the customer to be important and for the business to bring out the best. (Higgins et al., 2020) Information technology has resources to address it, and the help is due to IT capabilities.

1.2 IT Capabilities

Information technology uses variety devices, such as computers, notebooks, tables and mobile devices, to work with Internet-enabled data and run information-processing processes. In terms of CRM, it is about CRM systems. The level of implementation is derived from the information strategy and business plan to support the implemented business processes. IT capabilities are a broad area of interest (Gorsky, 2020), such as artificial intelligence engineering (Libai et al., 2020; Serova, 2019), business intelligence analysis (Lam et al., 2020), database management, cloud engineering, computer vision engineering, IT management for CRM (Zhang & Dai, 2020), network analysis, security analysis, or software development, web application

development, and knowledge management (Castagna et al., 2020). These capabilities play an important role in supporting CRM where customers feel unique and deserve optimal forms of communication in expected and unexpected situations too. Information technology helps to create optimal support based on unified communication using rules based on lexicon, common objections that are verified and processes that respect communication standards. It is easier to follow these criteria of guidelines for optimal communication with customers through CRM systems and their capabilities.

Specific examples of solution are visible in a diverse range of CRM systems (Capterra - CRM Software, 2022; Best CRM Software of 2022, 2022). There are the top CRM lists, the most popular, the most affordable, or lists by rating, and in terms of their user-friendly interface. To illustrate the default IT capabilities that are implemented in CRM systems, five representatives were selected, such as itracMarketer, Jumplead, Less Annoying CRM, or Odoo, and Zimplu CRM.

itracMarketer (itracMarketer, 2022; Capterra - CRM Software, 2022) focuses on creating and converting leads based on email marketing and CRM. The advantage is the calendar and email marketing. The system monitors contacts at various stages of the customer's journey. It is possible to combine different business systems and platforms with the collection of digital behavior from websites and microsites, via email and social media. Customer profiles are available to view details about customer behavior. Templates are focused on management. One of the great benefits is the automated marketing integration with workflow management, leadership, lead scoring, dynamic list management, email notifications, triggers and filters. Social networks are integrated for customer targeting, automatic publishing and conversation tracking (Facebook, Twitter, and LinkedIn). KPIs (Key Performance Indicators) use reports and analyses.

Jumplead (Jumplead, 2022; Capterra - CRM Software, 2022) focuses on cloud marketing automation. Benefit brings marketing leads by focusing on lead management and email marketing. Email marketing allows to track open email address, opt-out (unsubscribe) rate, and exit rate. Contact is based on emails, live chat, and a web form application. Contact profiles and leads are used to find information from web forms, email campaigns, and analytics. One of the great benefits is automating email and sales team notifications, and campaign support. KPIs use control panels in the form of dashboards and reports (lead scoring).

Less Annoying CRM (Less Annoying CRM, 2022; Best CRM Software of 2022, 2022) is designed for contact management and sales force automation (SFA). The advantage is contact management, calendar and tasks, leads and pipelines, customization, logging of email conversations. On one screen you see all the notes, files, tasks, events and contact information about pipeline. Communication is based on emails, phone calls with internal chat integration. KPIs use an email that is sent every morning with a summary of the day.

Odoo (Odoo, 2022; Best CRM Software of 2022, 2022) is an open source enterprise application for sales, organizing marketing activities, and increasing productivity. Benefits include billing and invoicing, employee management, financial management, inventory and marketing management. Communication with costumers uses email marketing, internal chat integration, and live chat. Templates are useful for emails. One of the great benefits is the automated marketing integration with the automated leads creation from emails and VoIP calls, or automated verification of account activity. There is integration of social networks. KPIs use

the control panel as a dashboard to display the status of a task or attention activity (lead scoring, ROI marketing campaigns).

Zimplu CRM (Zimplu, 2022; Capterra - CRM Software, 2022) is a web-based CRM system that allows salespeople to easily process accounts. The advantage is email integration. One of the great benefits is the automatic distribution of templates based on emails. The new opportunity is associated with a sales outlook and a forecast of the future of the sales game. KPIs use reports and charts to provide an overview into business.

The above overview shows the volume of services that are supported through CRM systems implementation. These include customer service, marketing and sales force automation, channel and knowledge management, or call center services. The question for this paper is "it is enough?" when CRM implementation and customers satisfaction are not always of the highest quality. Many IT projects, including CRM systems, have shortcomings because IT implementation has reserves. To solve this question, the following chapter describes the adopted method of solving the work with the necessary data.

2 Method Solution and Data

Based on the literature review, a wide range of information technology and the need for requirements for optimal CRM implementation are evident. These requirements are also important during and after a pandemic crisis, and it is intuitive to expect that IT has the capabilities to support them. For many IT projects, it is seen that IT users (customers, marketers, salespeople) are not always satisfied with CRM systems and lack more respect, empathy and patience. This situation is bad for business, which in many cases has to rely on virtual space; therefore the topic of this paper focuses on the controversy between IT capabilities and CRM implementation, which is not always at the maximum level with regards to dramatically changed conditions.

The method solution of this topic is based on:

(1) Literature review on customer relationship management and information technology capabilities. (Chapter 1)

(2) The existing problem has been identified on the basis of the controversy between IT capabilities and CRM implementation needs. (Chapter 2)

(3) The specification of appropriate metrics for CRM evaluation has been identified to know opportunities for improvement. (Chapter 2)

(4) For selected CRM systems, the data necessary to demonstrate the lack of interest in their implementation to improve low-interest metrics has been collected. These CRM systems were divided into four groups according to the number of employees in order to show the different interest in selected topics (metrics). (Chapter 3)

(5) The necessary data forms the basis for following analysis by Analytic Hierarchy Process (AHP) with the extension of decision-making under uncertainty by the fuzzy approach (the fuzzy AHP method) for the specification the optimal group of CRM systems with respect to metrics. (Chapter 3)

(6) Specification of a general view and a better approach for CRM implementation with discussion (Chapter 4).

Specifying the right metrics is the first important step to address this issue. There are many lists of CRM systems, one may choose according to preferences or read about the positive and negative experiences of customers from their implementation. But it is about the IT background and the people who work for customers through information technology. This paper discusses IT capabilities and their relationship to CRM. From a CRM perspective, these metrics are: automation support (1), database (2), data security (3), live chat (online meetings) integration (4), and method of implementation (5).

These metrics were selected from the perspective of IT implementation. For IT users, it is important to have the most friendly automation of the implemented processes through a template, online guide, or an actual trend based on artificial intelligence. The reason is better support for optimal work with the application and minimization of errors. Perhaps all IT users know the need to have the right data; therefore, there is interest in appropriate support for CRM systems in database and data security. CRM system implementation is not intuitive, and it is necessary to proceed in the optimal method. There are many proven methods and methodologies for implementing CRM systems without major shortcomings that cause errors in IT implementation and stop such IT projects. Finally, there is an interest in online communication that would promote immediate contact between people (IT users and experts on IT). It is about live chat and online meetings.

The necessary data was collected on CRM systems selected from the websites of vendors, Growjo (Growjo, 2022), which collects data on the fastest growing companies in the world in 2022, and Capterra (Capterra - CRM Software, 2022), which presents CRM software with reviews and features for selecting the required software for the business. Based on the estimated number of employees, 110 CRM systems from small solutions to complex ones were selected, and suitable data for processing was obtained for 97 of them. For each CRM system, there was interest in automation support (marketing automation), the need for a database with data security, live chat integration, and explaining how to implement it (method of implementation).

3 Data and Processing Extended with Elements of Uncertainty

The necessary data on selected CRM systems from four groups was collected. These groups were specified according to the estimated number of employees: 1-50 employees (first group, 54 CRM systems such as Toca CRM, crmboost, LeadMaster, or webCRM), 51-100 employees (second group, 13 CRM systems such as Capsule, Upsales CRM, MaxCustomer, or SalesUp! CRM), 101-500 employees (third group, 22 CRM systems such as SuperOffice CRM, Vela CRM, Suti CRM, or Creatio CRM), 501 and more employees (fourth group, 8 CRM systems such as Sugar CRM, Pipedrive, Zoho CRM, or Salesforce).

The positive news is that interest in automation is the focus of most CRM systems, regardless of the estimated number of employees. In total, there are about 25 CRM systems from the first group, 6 CRM systems from the second group, 18 CRM systems from the third group, and 6 CRM systems from the fourth group. The worse situation is visible in the live chat support, but there is more interest in larger enterprises than in smaller ones. In total, there are about 2 CRM systems from the first group, 1 CRM system from the second group, 5 CRM systems from the

third group, and 5 CRM systems from the fourth group. Better access to live chat also helps in optimal communication about IT implementation. It is not limited to communication with customers. The following table provides an overview the results achieved. See Table 1.

Table 1: Interest of CRM system vendors in appropriate IT issues
to support better CRM implementation

Selected metric	The first group (employees from 1 to 50, 54 CRM systems)	The second group (employees from 51 to 100, 13 CRM systems)	The third group (employees from 101 to 500, 22 CRM systems)	The fourth group (employees from 501 and above, 8 CRM systems)	Average in % for all groups of CRM systems
Automation support	25 (46.29%)	6 (46.15%)	18 (81.81%)	6 (75%)	62.31%
Database	6 (11.11%)	1 (7.69%)	2 (9.09%)	2 (25%)	13.22%
Data security	43 (79.62%)	6 (46.15%)	17 (77.27%)	7 (87.5%)	72.63%
Live chat integration	2 (3.70%)	1 (7.69%)	5 (22.72%)	5 (62.5%)	24.15%
Method of implementation	6 (11.11%)	1 (7.69%)	5 (22.72%)	3 (37.5%)	19.75%

Source: own work

On the contrary, the bad situation is visible in interest of clarifying the method (methodology) of implementation and database support in relation to the CRM system. It is very rare for vendors to provide some information on method (methodology) and database support, but this should be kept in mind when one implementing CRM. These two issues are weak for all vendors, regardless of the size of the company according the estimated number of employees. Only three of them explain how to start the implementation, such as the first free access and subsequent addition of more users (BlueCamroo), or interested in optimizing and managing projects (SmartCRM), or using design, build and training (Claritysoft CRM). Several others provide examples of good practice, tutorials, or guides. And several more clarify the method of implementation (CAS genesisWorld, Pipeliner CRM, Sales Agility) and agile approach (Agile CRM, Caspio, ClickUp, Scoro). A similar situation is seen for database support information. Only a few vendors explain a centralized custom database, database update, instance, and traditional relational database system, customizable database builder, or encrypted database. Again, this is very bad, because the database is an essential part of information systems, and it is the same for CRM systems. The data is stored in a database and

without optimal structure and relations it will not work. An inspiring approach to the database is about building new relations without losing relevant data (BlueCamroo), a customizable database builder (SmartMatchApp, Zoho CRM), a traditional relational database (Bluwave CRM, Caspio, Cool Life CRM, eWay CRM, Pipeliner CRM, Salesforce).

The situation is much better in data security, where vendors clarify documents storage, data import/export, data access or backup, but only a few take care about security based on permissions, passwords, and data synchronization or duplication. For others, optimal care is given to password manager (Capsule, Lead Capsule, Nutshell CRM), artificial intelligence eliminates repetitive data entry (Veloxy), data authorization configuration (Cool Life CRM), or data security (Act!, Insightly). And the inspiring approach is visible in securing description data for needed levels from application, network to physical access level (Creatio CRM).

The above lines are about a more intuitive approach to explaining different approaches to CRM implementation in selected CRM systems. To specify the optimal approach to CRM systems from various vendors, it is good to use a more sophisticated method that has the ability to work under uncertainty. For such an analysis, the fuzzy AHP (Analytic Hierarchy Process) method has been selected to solve CRM implementation. The AHP method (Saaty, 2008; What Is The Analytic Hierarchy Process (AHP)?, 2022) is well-known method with use in various decision-making situations. A positive capability is to extend the procedure with elements of uncertainty using fuzzy set theory (Sangwook, 2016; Demirel et al., 2008). This method is used to derive weights (priorities) from a fuzzy comparison matrix. In this paper, the fuzzy AHP is applied to decision-making problems in CRM systems. Benefit is visible in comparison of selected groups of CRM systems through specified metrics in order to show better way in CRM system choice.

The procedure for using the fuzzy AHP (Tesfamariam & Sadiq, 2006) use the initial steps such as: drawn up a hierarchic tree (1), create a fuzzy pairwise comparison matrix (2), check for consistency (CI) of values (3) to continue with the following steps: calculate the fuzzy weights (4) and individual preferences (5), final ranking and decision-making (6). The practical work was carried out in MS Excel and traditional Saaty scale definition fuzzy triangular scale (Ogrodnik, 2019) was used. See Table 2.

Fuzzy numbers represent any real number that are in the interval [0, 1] using fuzzy membership functions. The advantage of triangular fuzzy numbers is visible in the ability to simplify and represent information processing in a fuzzy environment (Khazaeni et al., 2012; Sun, 2010). If a triangular fuzzy number is marked Ñ on R such as (l, m, u) then membership function $\mu_{\tilde{N}}(x)$ is specified by relation:

$$\mu_{\tilde{N}}(x) = \begin{cases} \frac{x-l}{m-l} & for\ l \leq x \leq m \\ \frac{u-x}{u-m} & for\ m \leq x \leq u \\ 0 & for\ otherwise \end{cases} \quad (1)$$

For the triangular fuzzy number Ñ = (l, m, u), the relation applies that:

$$u = \max\{x|x \in supp(N)\},\ l = \min\{x|x \in supp(N)\} \quad (2)$$

Table 2: Saaty scale definition fuzzy triangular scale and reciprocal fuzzy scale

Definition	Fuzzy Triangular Scale	Reciprocal Fuzzy Scale
1 Equally important	(1, 1, 1)	(1, 1, 1)
3 Weakly important	(2, 3, 4)	(1/4, 1/3, 1/2)
5 Fairly important	(4, 5, 6)	(1/6, 1/5, 1/4)
7 Strongly important	(6, 7, 8)	(1/8, 1/7, 1/6)
9 Absolutely important	(9,9,9)	(1/9, 1/9, 1/9)

Source: own work based on multi-criteria analysis of design solutions
in architecture (Ogrodnik, 2019)

The beginning of the realized activities focuses on driving up hierarchical tree. This tree is about decision hierarchy for optimal CRM implementation through specified metrics (criteria) for selected groups of vendors of CRM systems according to the number employees (alternatives). See Figure 1.
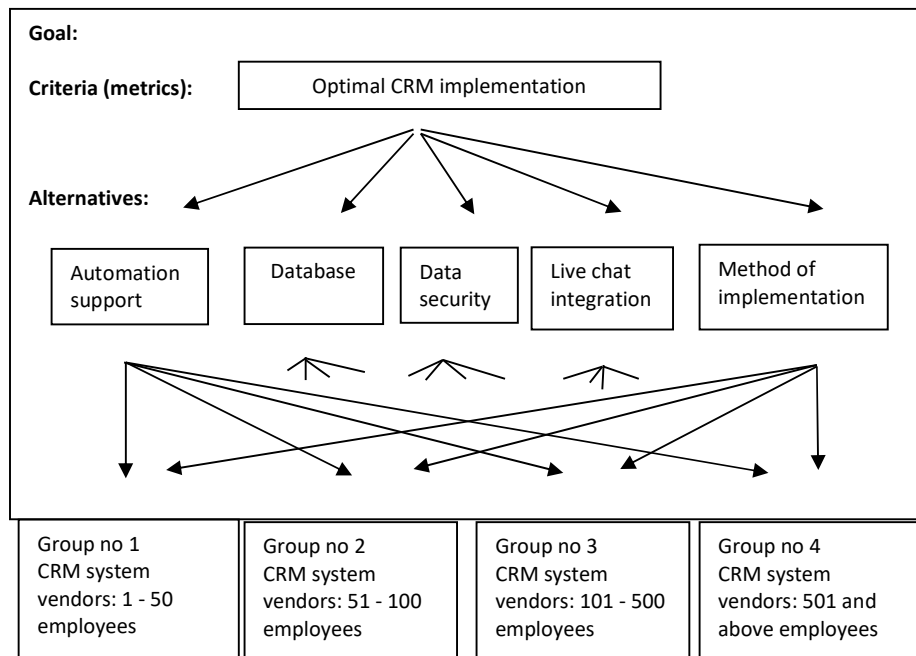

Figure 1: Hierarchy tree of the analytical hierarchy process (AHP)
for optimal CRM implementation (own work)

For the final ranking of individual groups of CRM systems, the fuzzy pairwise comparison matrix was created for the specified metrics. Evaluation is shown in Table 3.

Table 3: The fuzzy pairwise comparison matrix for specified metrics

	Automation support			Database			Data security			Live chat integration			Method of implementation		
Automation support (AS)	1	1	1	1/6	1/5	1/4	1/4	1/3	1/2	2	3	4	2	3	4
Database (DB)	4	5	6	1	1	1	2	3	4	9	9	9	6	7	8
Data security (DS)	2	3	4	1/4	1/3	1/2	1	1	1	6	7	8	2	3	4
Live chat integration (LChI)	1/4	1/3	1/2	1/9	1/9	1/9	1/8	1/7	1/6	1	1	1	1/4	1/3	1/2
Method of implementation (MI)	1/4	1/3	1/2	1/8	1/7	1/6	1/4	1/3	1/2	2	3	4	1	1	1

Source: own work

Their consistency is checked using Consistency Ratio (CR) where CR < 0.1 is acceptable, and

$$CR = \frac{CI}{RI}, \; CI = \frac{\lambda_{max} - n}{n-1} \text{ for n = 5, and RI = 1.12.} \tag{3}$$

Similarly, the fuzzy pairwise comparison matrix creation for the selected groups (group no 1, …, group no 4) by specified metrics. See Table 4. The fuzzy pairwise comparison matrix creates triangular numbers, $\tilde{A} = \{\tilde{a}_{ij}\}$ for i, j = 1, …, n where:

$$\begin{cases} \tilde{a}_{ij} = (l_{ij}, m_{ij}, u_{ij}) \\ \tilde{a}_{ji} = \tilde{a}_{ij}^{-1} = (\frac{1}{u_{ij}}, \frac{1}{m_{ij}}, \frac{1}{l_{ij}}) \\ for \; i,j = 1,...,n, \; i \neq j \\ \tilde{a}_{ij} = \tilde{a}_{ji} = (1,1,1) \; for \; i = j \end{cases} \tag{4}$$

Table 4: The fuzzy pairwise comparison matrix for selected groups by specified metrics

Automation support (w.r.t.)												
	Group no 1			Group no 2			Group no 3			Group no 4		
Group no 1	1	1	1	6	7	8	1	2	3	2	3	4
Group no 2	1/8	1/7	1/6	1	1	1	1/4	1/3	1/2	1	1	1
Group no 3	1/3	1/2	1	2	3	4	1	1	1	1	2	3
Group no 4	1/4	1/3	1/2	1	1	1	1/3	1/2	1	1	1	1

Database (w.r.t.)												
	Group no 1			Group no 2			Group no 3			Group no 4		
Group no 1	1	1	1	6	7	8	4	5	6	4	5	6
Group no 2	1/8	1/7	1/6	1	1	1	1/4	1/3	1/2	1/4	1/3	1/2
Group no 3	1/6	1/5	1/4	2	3	4	1	1	1	1	1	1
Group no 4	1/6	1/5	1/4	2	3	4	1	1	1	1	1	1

Data security (w.r.t.)

	Group no 1			Group no 2			Group no 3			Group no 4		
Group no 1	1	1	1	4	5	6	1/4	1/3	1/2	2	3	4
Group no 2	1/6	1/5	1/4	1	1	1	1/8	1/7	1/6	1/4	1/3	1/2
Group no 3	2	3	4	6	7	8	1	1	1	6	7	8
Group no 4	1/4	1/3	1/2	2	3	4	1/8	1/7	1/6	1	1	1

Live chat integration (w.r.t.)

	Group no 1			Group no 2			Group no 3			Group no 4		
Group no 1	1	1	1	2	3	4	1/6	1/5	1/4	1/6	1/5	1/4
Group no 2	1/4	1/3	1/2	1	1	1	1/6	1/5	1/4	1/6	1/5	1/4
Group no 3	4	5	6	4	5	6	1	1	1	1	1	1
Group no 4	4	5	6	4	5	6	1	1	1	1	1	1

Method of implementation (w.r.t.)

	Group no 1			Group no 2			Group no 3			Group no 4		
Group no 1	1	1	1	9	9	9	4	5	6	6	7	8
Group no 2	1/9	1/9	1/9	1	1	1	1/8	1/7	1/6	1/6	1/5	1/4
Group no 3	1/6	1/5	1/4	6	7	8	1	1	1	2	3	4
Group no 4	1/8	1/7	1/6	4	5	6	1/4	1/3	1/2	1	1	1

Source: own work

To specify fuzzy weights $\tilde{w}_i$ (for i = 1,..., n), the geometric mean of fuzzy comparison values $\tilde{g}_i$ (for i = 1, ..., n) is used:

$$\tilde{g}_i = (\tilde{a}_{i1} \otimes \tilde{a}_{i2} \otimes ... \otimes \tilde{a}_{im})^{1/n}, \text{ and } \tilde{w}_i = \tilde{g}_i \otimes [\tilde{g}_1 \oplus \tilde{g}_2 \oplus ... \oplus \tilde{g}_n]^{-1} \quad (5)$$

for specified metrics such as automation support, database, data security, live chat integration, and method of implementation. See Table 5.

Table 5: The priority vectors (normalized)

	Weight	Group no 1	Group no 2	Group no 3	Group no 4
Automation support	0.122596	0.499319	0.092360	0.275151	0.133169
Database	0.516629	0.630070	0.064350	0.152790	0.152790
Data security	0.247770	0.257011	0.054030	0.583140	0.105819
Live chat integration	0.038286	0.110543	0.065113	0.412172	0.412172
Method of implementation	0.074719	0.636579	0.036239	0.218693	0.108488

Source: own work

The last step is the calculation of the final ranking based on the weight and priority vector for selected groups (group no 1, …, group no 4) according to the specified metrics. See Table 6.

Table 6: Final ranking to decision-making

	Group no 1	Group no 2	Group no 3	Group no 4
Automation support	0.061215	0.011323	0.033733	0.016326
Database	0.325513	0.033245	0.078936	0.078936
Data security	0.063680	0.013387	0.144484	0.026219
Live chat integration	0.004232	0.002493	0.015781	0.015781
Method of implementation	0.047564	0.002708	0.016340	0.008106
Summary	0.502204	0.063156	0.289273	0.145367

Source: own work

The calculated summary of the final ranking includes the final decision based on the results of this process. Group no 1 has the best evaluation with number 0.502204 (maximum of values). Group no 2 has the worst evaluation with number 0.063156 (minimum of values).

4 Results and Discussion

The results from the above realized monitoring CRM systems and the calculated analysis using the fuzzy AHP method show that there is a gap in the implementation of IT for CRM. It is seen in the ranking of individual groups of CRM system vendors specified according to the estimated number of employees. This scale of evaluation is between 0.502204 (for group no 1, employees from 1 to 50) and 0.063156 (for group no 2, employees from 51 to 100). The first two best groups are no 1 and no 3 (employees from 101 to 500). It is positive for both that data security is taken care of (in more than 77% of selected CRM systems) and there is also high interest is about automation support (81.81% is the highest in group no 3 and a high number is also evident in group no 1 – 46.29%). On the contrary, group no 4 is less interested in the database, which reaches 25% in relation with group no 1 (11.11%) and group no 3 has only 9.09%. A similar situation is evident in the interest in the method of implementation, where group no 4 reaches 37.5% compared to only 11.11% for group no 1 and 22.72% for group no 3. The percentages are given in Table 1, where the interest of CRM system vendors in appropriate IT issues to support better CRM implementation is noted. For selected CRM systems in specified groups, specified metrics were monitored, such as automation support, database, data security, live chat integration, and method of implementation.

In general, there is no optimal interest in the method of implementation and the database for data store. In the number of averages (in % for all groups of CRM systems) the database (13.22%) and the method of implementation (19.75%) achieve the lowest values. This reality is one of the weakness of CRM systems because the database must be in very good condition to support information systems such as CRM. In many cases, the database is not compatible with the structure with the business objectives, or the stored data is highly imprecise and inconsistent; therefore, the information in fields is ambiguous, and such database does not optimally support business processes.

There must be more interest in artificial intelligence implementation to help optimize the database and adopt of an optimal method for IT implementation. Some implementation standards that are well-known in IT are missing. Initial IT implementation is described, for example, as business planning (CRM strategy and business plan), project design (prioritization), information technology selection (vendor and technology evaluation), development (customization and database design), delivery (deployment, documentation and IT training users) and measurement (metrics evaluation) (Palacios et al., 2007). In this situation, it is natural that more IT project are stopped or in trouble because their IT users are not satisfied with the IT implementation including CRM systems. In 2017, the Project Management Institute reports that 14% of IT projects fail, 31% do not meet with targets, and 49% are delayed (Success Rates Rise, 2017). The subtitle this survey is apt that it is a transformation of high cost of low performance. And the situation on this issue is not better in 2022, when a large percentage of new software projects fail again (Chand, 2022). From the vendor's perspective, CRM implementation is simple, but it is not intuitive, and the process requires optimal care. There is a visible streamlined approach from business needs to training IT users in their CRM system.

The discussion is about a suitable vision for the future development of IT implementation at the maximum level in the CRM system. For optimal CRM implementation, it is necessary to show all processes that must be adopted. Simplification is good, but it leads to IT implementation failure. It seems like two different worlds, one being specialized CRM systems, where it is easy and simple, and the other is specialized information technology, where it is based on a proven approach and methods with many options and recommendations for IT implementation solutions. For the optimal CRM implementation, it is necessary to use available information technologies at the maximum level in CRM systems. From the performed analysis, group no 1 has the best ranking with 0.502204 using the fuzzy AHP method, and the adopted hierarchy of interest about specified metrics in this group of CRM systems is inspiring to others. See Figure 2.

```
┌──────────────────────────────────────────┬──────────────────────────────────────────┐
│ for group no 1                           │ for group no 4                           │
│                                          │                                          │
│         ┌──────────────────┐             │         ┌──────────────────┐             │
│         │  data security   │             │         │  data security   │             │
│         └──────────────────┘             │         └──────────────────┘             │
│                                          │                                          │
│         ┌──────────────────┐             │         ┌──────────────────┐             │
│         │ automation support│            │         │ automation support│            │
│         └──────────────────┘             │         └──────────────────┘             │
│                                          │                                          │
│    ┌─────────────────────────────┐       │         ┌──────────────────┐             │
│    │database and method of        │      │         │live chat integration│          │
│    │implementation                │      │         └──────────────────┘             │
│    └─────────────────────────────┘       │                                          │
│                                          │                                          │
│  ┌──────────────────────────────────┐    │      ┌──────────────────────┐            │
│  │other support such as live chat    │   │      │method of implementation│          │
│  │integration                        │   │      └──────────────────────┘            │
│  └──────────────────────────────────┘    │                                          │
│                                          │         ┌──────────────────┐             │
│                                          │         │    database      │             │
│                                          │         └──────────────────┘             │
└──────────────────────────────────────────┴──────────────────────────────────────────┘
```
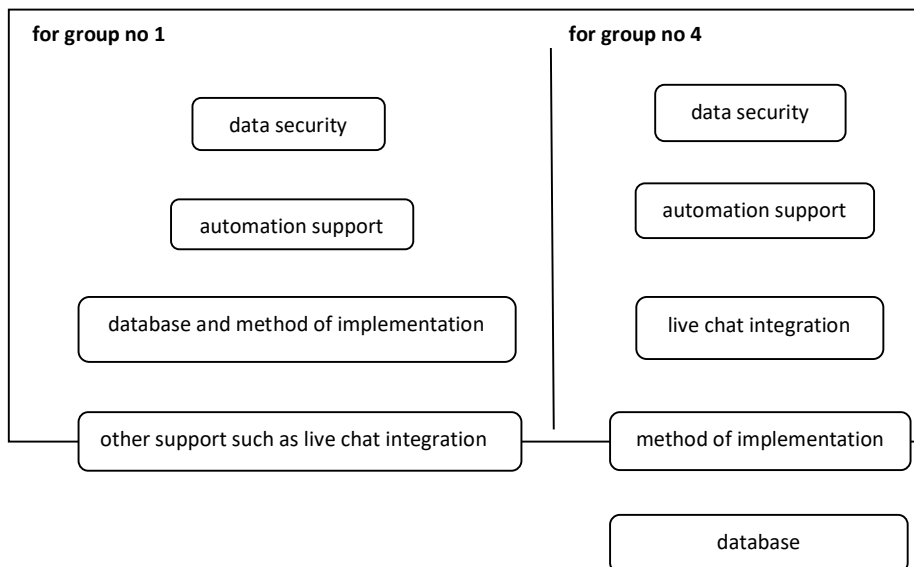
Figure 2: Recommended structure interest about selected issues for CRM implementation
(own work)

This approach is a little different from the approach of vendors from group no 4 (employees from 501 and above), where a sophisticated and complex implementation of CRM systems is expected. The beginning of the hierarchy is the same, data security and automation support (see Figure 2), but live chat integration has higher interest. This issue is in third place with 62.5% against 3.70% for group no 1. An explanation for this may be the expectation that method of implementation and database are secured at a high level through internal processes of CRM system, and these vendors do not explain in detail the necessary context for IT users. This may be one of sources of shortcomings in IT implementation, as the method of implementation and database are an integral part of CRM implementation.

From a general point of view, if CRM_Implementation is variable to define CRM implementation process, then it is a process with other necessary processes that specify the optimal approach using the formula:

$$CRM\_Implementation = \prod_{i=1}^{n} P_i, \qquad (6)$$

where P_i from i=1 to n (n = 10) represents the necessary processes (activities) associated with the IT implementation. When one activity is neglected, it will have a bad effect on CRM implementation. Default processes are CRM strategy identification (P_1), CRM process requests (P_2), required data specification (P_3), suitable information technologies selection (P_4), CRM settings (P_5), customization (P_6), integration of third-party applications (P_7), testing links to set targets (P_8), IT user training (P_9), and evaluation (P_{10}).

It is well-known that optimal CRM implementation has requirements for appropriate hardware and software and, of course, optimal IT skills. It is not just buying the necessary hardware and software, or cloud access for IT users. Hardware and software do not have the ability to improve business. It is about the way they are used and skills of IT user who understand the implemented processes; therefore, the lack of information on the recommended proven method (methodology) of CRM implementation and the needs of databases have an impact on the success of the CRM system. In general, CRM system vendors show minimally interest in presenting the optimal method of implementation for their CRM systems (about 20%). A similar situation is in the interest of describing the database and specifying the necessary rules that are recommended for active work with data (about 13%). The implementation of information technology and database technology has proven rules, and lack of interest in them directly affects the approach of IT users (businessmen) to CRM implementation. Many CRM system websites claim that getting started is simply and easy. It is correct, but with an optimal background and interest in all activities (processes) that affect the CRM implementation. Improper CRM implementation caused by bad IT choices results in higher hardware and software costs and training time than estimated.

5 Conclusion

This paper focuses on IT capabilities to support better customer contacts through CRM systems, such as one of many information systems that are implemented in business.

Information technologies have the ability to help, but the question is the optimal IT implementation in CRM. This controversy is visible in satisfaction with IT projects that are not completed without shortcomings. To actively address this issue, the literature review was performed, and appropriate metrics for evaluation were specified to better identify IT capabilities. These metrics include automation support, database and data security, live chat integration, and method of implementation. Based on the estimated number of employees of CRM system vendors, 110 CRM systems were selected, and suitable data for processing was obtained for 97 of them. To specify the optimal approach to CRM implementation using the hierarchy of interest about specified metrics, the fuzzy AHP method was used to extend the procedure with elements of uncertainty using the fuzzy set theory for specified metrics through groups of vendors of CRM systems by number employees.

This approach brings the final ranking for each group with the best evaluation for group no 1 (employees from 1 to 50) and the worst evaluation for group no 2 (employees from 51 to 100). The visible difference is in specified metrics, such as between group no 1 and no 4 (employees from 501 and above). The same interest is in data security and automation support, but the difference is in the support of live chat integration for which there is more interest in CRM systems from group no 4. In general, achieved results show that 72.63% of CRM systems are interested in data security, 62.31% of CRM systems have implemented automation support, and a relatively good situation is evident in the live chat integration, where about 24.15% of CRM systems have an active solution in this issue. Bad results are achieved due to the interest in methods of implementation, because only 19.75% of CRM systems pay attention on it. The situation is similar with databases, where only 13.22% of CRM systems have described database requirements in relation to their CRM solution. It is very rare for vendors to provide any information on this issue, but some have identified an inspiring approach. A good example is the division of implementation through design, build and training (Claritysoft CRM), or agile approach (Agile CRM, Caspio, ClickUp, Scoro). For the databases, it is a customizable database builder (SmartMatchApp, Zoho CRM), or traditional relational database (Bluwave CRM, Caspio, Cool Life CRM, eWay CRM, Pipeliner CRM, Salesforce). The results show that there is a gap in interest in the database and method of implementation for CRM. Some implementation standards that are well-known in IT are missing in CRM. This simplification leads to IT implementation failure for CRM systems.

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