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Does CRM Technology Help in Achieving Sustainable Competitive Advantage?

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Abstract

Purpose: To validate the impact of Customer Relationship Management (CRM) technologies on stable competitive advantage of companies. Confronting the existing ambiguous research.

Design/methodology/approach: In step one, 757 publications were verified in a systematic literature review to establish precise CRM technology implementation success indicators. In step two, phone surveys were conducted with 608 corporate respondents to link CRM technology implementation success indicators with stable competitive advantage. Step three involved statistical inference applying machine-learning powered association rules/basket analysis.

Findings: The best and the worst-performing companies simultaneously reported only low to moderate levels of CRM technology implementation success indicators. Both groups of companies do not differ significantly as far as CRM technology applications are concerned. Hence, direct impact of CRM technology on achieving stable competitive advantage was negatively validated.

Research limitations/implications: Spatial positioning of this research in the Polish market demands studies in other markets to ensure the generality of findings. Research on CRM technology does not embrace other industry 4.0 technologies. Studies dealing with other technologies would shed more light on the overall role of the industry 4.0 revolution and the constraints in implementing new technologies.

Originality/value: The research supposed that the ambiguity in existing research is caused by the methodical mistake: mixing the best and the worst-performing companies in one research survey. A hypothesis was established stating that the CRM technologies will only significantly impact stable competitive advantage of the best performing firms that have the competence to exploit their potential. This hypothesis was negatively verified.

Keywords: CRM, industry 4.0, sustainable competitive advantage.

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Czy technologie CRM prowadzą do osiągnięcia stabilnej przewagi konkurencyjnej?

Streszczenie

Cel: weryfikacja wpływu technologii informatycznych służących do zarządzania relacjami z klientami (*Customer Relationship Management*, CRM) na trwałą przewagę konkurencyjną przedsiębiorstw je wykorzystujących w świetle niejednoznacznych wyników dotychczasowych badań w tym zakresie.
Metodologia: na podstawie systematycznego przeglądu literatury, w trakcie którego zweryfikowano 757 źródeł, określono konkretne wskaźniki wskazujące na sukces projektów wdrożeniowych CRM. Następnie przeprowadzono ankietę telefoniczną wśród 608 firm. Zebrany materiał został poddany analizie statystycznej z wykorzystaniem technik uczenia maszynowego (analizy asocjacji/koszykowej).
Wyniki: najlepiej i najgorzej gospodarujące przedsiębiorstwa osiągnęły niskie lub średnie poziomy wskaźników wskazujących na sukces wdrożenia technologii CRM. Obie grupy przedsiębiorstw nie różnią się w sposób zasadniczy w zakresie wykorzystania technologii CRM w praktyce biznesowej. Stąd też, nie potwierdzono istotnego wpływu technologii CRM na osiąganie przez przedsiębiorstwa stabilnej przewagi konkurencyjnej.
Ograniczenia/implikacje badawcze: projekt badawczy zrealizowano wśród przedsiębiorstw zarejestrowanych w Polsce. Powtórzenie badania na innych rynkach zwiększyłoby prawdopodobieństwo, że przedstawione wyniki mają uniwersalny charakter. Przedmiotem badania była jedna z technologii informatycznych określanych wspólną nazwą technologii przemysłu 4.0. Przeprowadzenie procedury badawczej z uwzględnieniem innych technologii wchodzących w skład tej grupy, ukazałoby szerzej rolę rewolucji przemysłowej 4.0 i trudności w implementacji oferowanych przez nią technologii.
Oryginalność/wartość: przyjęto założenie, że na wyniki dotychczasowych, niejednoznacznych badań w zakresie wpływu technologii CRM na osiąganie przez przedsiębiorstwa trwałej przewagi konkurencyjnej wpływ ma błąd metodyczny, w postaci mieszania w operacie badawczym firm odnoszących sukcesy rynkowe i firm gospodarujących z mniejszym powodzeniem. Postawiono hipotezę, że technologie CRM istotnie wpływają na osiąganie przewagi konkurencyjnej tylko przez firmy najlepsze, które potrafią umiejętnie wykorzystać ich potencjał. Hipotezę tę zweryfikowano negatywnie.

Słowa kluczowe: CRM, przemysł 4.0, stabilna przewaga konkurencyjna.

1. Introduction

Is the world getting smarter and a better place to live under the fourth industrial revolution? Although industry 4.0 is not free from constraints and challenges to overcome, the COVID-19 crisis has basically proven its utilitarian value for countries, cities, organizations and individuals (Hussain et al., 2021). New technologies create promising opportunities (for businesses, i.a., developing new business models) (Tohănean et al., 2020) and they are essential for progress and growth (Dymitrowski & Mielcarek, 2021). Still, their proper implementation and monetization poses a significant managerial challenge both in manufacturing (Ma et al., 2019) and services (Manca et al., 2018).

One of the crucial aspects of digitalization is data management and integration. Innovative technologies that are based on cyber-physical systems, the Internet of Things and cloud computing produce tons of data through software applications and peripherals such as sensors and electronics (Li et al.,

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2019). An interesting subsegment among big data applications is Customer Relationship Management (CRM) software. CRM solutions are geared toward the management of business accounts and marketing communication to support successful interactions with prospective buyers and clients.

There are two fundamental reasons for this paper to examine the impact of CRM and customer big data analytics on firm performance. One is the excessive investment in CRM licenses and implementation services, which has been continuously increasing for years, to reach US$64,522.66m in 2021 (with estimates of US$73,010.25m in 2022 and US$116,110.70m by 2026) (Statista, 2021). On the other hand, CRM technology projects are often reported to fail in terms of delivering measurable business goals (De Luca et al., 2020; Kumar & Reinartz, 2018).

However, numerous industry reports and academic papers that quote high CRM failure rates repeatedly concentrate on the overall implementation statistics (Edinger, 2018; Nguyen et al., 2020). By doing so, they do not differentiate between the reports of leading businesses and less successful companies. One can imagine that, if the respondents in a survey are recruited from a sample that reproduces the general population of business entities, most of them will represent average and poor performing companies. In turn, their reports on CRM failure are likely to reflect their own internal inability to capitalize on this technology, not the lacking potential of CRM systems to support business goals. The aim of this paper is, therefore, to verify, whether it is possibly a methodological failure. Such a failure would significantly limit the ability to reach impartial conclusions on the utility of CRM technology, which is a knowledge gap in itself. It would also have potentially a wider impact on all empirically-based research where competitive advantage is the target variable. Virtually any survey conducted on a general sample of companies can be expected to report no links between a new technology, organizational innovation or business model, and business performance, as their partial imitation or unskillful replication among the swarm of average and poor performing firms is always likely to be unsuccessful (Teece et al., 1997). Therefore, the following hypothesis is proposed:

H1: CRM technology will highly positively impact the sustainable competitive advantage of market leaders only

The process of verifying the adopted hypothesis necessitated two tasks to be accomplished. The first one was to determine how the CRM and general relationship management/marketing literature defines the success of CRM software implementation. Therefore, in section 'Theoretical Background', the results of a systematic literature review based on 757 papers were reported as well as a definition of sustainable competitive advantage was proposed. The second task was to separate the leading businesses from other companies to concentrate on their true experiences with CRM software.

Should the market leaders report high proficiency in the deployment of CRM technology, the inconclusive or negative experiences of other less successful companies could be related predominately to their individual incompetence and less to the actual potential of CRM to support business in achieving sustainable competitive advantage. Thus, CRM technology could be assessed more objectively. Therefore, section 'Materials and Methods' introduces a novel stringent method of assessing the actual success rate of CRM solutions based on the combination of the extended 0–10-point grading scale and basket analysis/association rules mining. Section 'Results and Discussion' presents and comments on the results of the empirical research based on a 608-strong sample of Polish businesses interviewed by phone. The remaining part of this paper includes section 'Conclusions, Research Contribution & Limitations', which confronts the aim of research with its actual contribution and limitations.

2. Theoretical Background

2.1. The Method of Systematic Literature Review

The systematic literature review is a method that helps in transparent and unbiased identification of conceptual content as well as in identifying trends, themes and topics emerging in the research field (Vural, 2017). Given the vast number of scientific publications on relationship management/marketing, it proposes a clear guidance on how to choose reliable scientific sources and substantive contributions focused on the factual core of the research (Gough & Richardson, 2018). The process includes three major steps:

– selection of academic resources,
– screening the pre-selected papers,
– the actual reviewing procedure.

The selection of academic resources was based on the 'List of scientific journals and reviewed materials from international conferences', published according to the Act on Higher Education and Science of 20th July 2018, article 267, paragraph 3 by the Polish Ministry of Science. The selection procedure for this purpose of writing this paper was based on the version of the list dated 2019.08.02, which contained 29,040 journals and conference publications. Their recognition is reflected in a point system starting with 20 points (publications with limited impact) and rises within the levels of 40, 70, 100, 140 and 200 points (for the periodicals with the highest impact). In order to choose the most qualitative and factual journals, the following criteria were applied:

– journals devoted to the discipline of management and quality science (3,532),
– journals that included one of the following terms in their title: 'management', 'marketing', or 'business' and which were granted at least 70 points (315),

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– journals devoted to overall strategic management or broadly positioned (e.g. service markets or B2B/B2C markets) (43).

For the reason of retaining the potential for generalization, the final group of journals did not include such periodicals which were devoted to a specific region, industry or management/marketing function. In addition, for being an academic source exclusively devoted to relationship management/marketing, Journal of Relationship Marketing (rated with 20 points) was included in the final group.

The screening procedure was based on the mix of search criteria (Table 1), adapted to the scientific databases which hosted the content of selected journals (direct publishers or third-party multisource databases). As papers on management usually contain lots of 'offshoot referrals', the query was generally limited to the following search fields: title, abstract and keywords – omitting the body of the texts (Czakon et al., 2019). In addition, the query was limited to papers from 2010, because some concepts, especially of technological nature, may turn to be fads or passing fashions (Abrahamson, 1991).

Table 1
Screening Procedure – Search Criteria Syntax

Publisher	Main query: "relationship management" or "relationship marketing"	Anywhere	Title	Abstract	Keywords	Other that main text	Date: 2010 and newer
Academy of Management	×		×	×			×
Cambridge University	×	×					×
Cracow University of Economics	×						
Elsevier	×		×	×	×		×
Emerald (via ProQuest)	×					×	×
Harvard Business Scool Publishing	×						×
Informs (Management Science)	×		×		×		
Informs (via ProQuest)	×					×	×
Sage (Marketing Theory via Ebsco)	×		×	×			×
Sage (via ProQuest)	×					×	×
Springer	×						×
Taylor Francis	×		×		×		×
Wiley & Sons	×	×					×

Source: This table was prepared by the author of this study.

Table 2 includes the list of 44 journals qualified for the screening and reviewing procedure. Columns '1', '2' and '3' refer to the number of papers in subsequent review stages: (1) practical screening by title, (2) abstract and keywords screening, and (3) full paper review (Czakon 2011; Fink, 2010). Some of the journals did not publish any paper referring to the search terms in the specified period of time ('0' in column '1'). To ensure transparency in the two-step screening qualifying process, some exclusion criteria were adopted (Vural, 2017):

– random use of keywords: keywords absent in the abstract,
– auxiliary use of key words: papers devoted to the issues that lay beyond the scope of the paper,
– highly theoretical approach: papers exploiting in a general way some basic relational factors like trust and commitment,
– industry- or firm-specific studies: papers with only narrow industrial focus (e.g., one industry perspective) without potential for more general findings,
– nationally or regionally oriented studies: papers with only narrow territorial perspective (e.g. exploring the impact of national culture on relationship management/marketing or presenting empirical research based on limited number of entities situated in a peripheral economy),
– marketing function specific studies: papers providing in-depth inside in particular operational tools and techniques (e.g. mobile phone applications).

Table 2
Journals and Papers Included in the Screening and Reviewing Procedure

Journal	1	2	3
Academy of Management Journal	1	0	0
Business Economics	4	0	0
Business Horizons	16	11	8
Entrepreneurial Business and Economics Review	4	1	1
Industrial Marketing Management	112	91	38
International Business Review	6	5	1
International Journal of Management Reviews	23	11	2
International Journal of Research in Marketing	7	1	1
Journal of Business and Industrial Marketing	64	26	5
Journal of Business Research	63	37	20
Journal of Consumer Marketing	11	9	1

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Table 2 – continued

Journal	1	2	3
Journal of International Management	1	0	0
Journal of International Marketing	12	3	2
Journal of Management and Governance	11	0	0
Journal of Management and Organization	1	0	0
Journal of Marketing	18	12	1
Journal of Marketing Management	3	2	1
Journal of Marketing Research	9	4	1
Journal of Relationship Management	20	17	2
Journal of Service Management	23	12	2
Journal of Services Marketing	61	33	13
Journal of Strategic Marketing	11	6	3
Journal of the Academy of Marketing Science	157	62	18
Management and Organization Review	1	0	0
Management Research Review	15	6	2
Marketing Letters	20	10	3
Marketing Science	9	6	0
Marketing Theory	2	2	0
Omega – International Journal of Management Science	4	2	0
Service Business	50	15	3
Strategic Management Journal	18	4	1
Total number of papers examined:	**757**	**388**	**129**

Source: This table was prepared by the author of this study.

The chosen journals mainly represent the domain of strategic management, because this research concentrates more on the business impact of CRM technology rather than on the particularities of different CRM instances, products and ICT milieus. The search terms were very broadly positioned to prevent any potentially valuable insights being lost. The applied syntaxes included: “relationship management” or “marketing” + “competitive advantage” or “business performance”. Finally, 129 papers were reviewed in detail with some additional sources exploring the themes raised in the primary group.

The reviewing procedure included a general descriptive analysis and the detailed analysis (the findings of the latter are reported in Section 2.2). The general descriptive analysis revealed several interconnected relationship management/marketing-related themes. Typically, most of the reviewed papers thoroughly addressed two or three of them, while simultaneously dealing with some other in the background.

It does not come as surprise that the most popular theme was Customer Relationship Management. These papers usually tried to arrange some processes, tools, or techniques and link them with some aggregated constructs, for example, distinctive customer-related capabilities. In turn, their impact on broadly understood business performance was examined.

In some papers, corporate culture was presented as the invisible but decisive factor in securing the companies' success, for example, through employee commitment and empathic customer encounter. At a more operational level, the impact of internal marketing and HRM techniques on successful CRM implementations were examined.

The literature directly focusing on the ICT revealed two focal interests. Some papers examined the impact of ICT-related capabilities on the effectiveness of the other business areas like marketing and sales. The other emphasized the role of proper IT governance underlining the limited impact of new technologies on the company bottom line if not properly anchored in the organizational context. This included professional project management (e.g. optimization and implementation of business processes) and clear strategic relationship orientation demonstrated in the top management decisions.

Online relationships (especially via social media) were another significant topic related to an ICT tool and a communication channel at the same time. Again, the issue of proper IT governance was highlighted. Developing engaged brand communities instead of spamming social media users with remote marketing messages was frequently presented as the main goal of social customer relationship management.

The notion of innovativeness was also clearly visible in the knowledge management-focused papers. These papers emphasized mainly the capabilities to integrate customer knowledge into dialogue and analytical processes. The latter were present in papers evaluating the role of varied relational metrics in assessing and predicting customer value.

Other issues covered in the reviewed papers, which clearly go beyond the scope of this paper, included customer value co-creation, supply chain management and corporate social responsibility.

2.2. The Impact of CRM Technology on Businesses

The detailed literature review analyzes successful CRM software implementation and utilization from a variety of vantage points. Potential benefits range from cost and time reduction by automating tasks in sales and after-sales workflows, and by streamlining administration, to real-time

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access to sales accounts and big data analytics enabling relational selling (Park et al., 2010). Extracting, processing and providing customer knowledge enables accurate targeting of marketing campaigns powered by advanced predictive modeling tools (Hallikainen et al., 2019). Especially in medium and large organizations, collaborative CRM processes have to be powered by modern technology. The number of customers, servicing employees, virtual and physical locations, and the distribution of interactions over time would otherwise make it virtually impossible for such organizations to offer a seamless customer service (Ahani et al., 2017; Zand et al., 2018). Collaborative CRM instances enable file sharing and editing, chat and discussion forums functionality, online project management, submission of improvement ideas, and much more. In fact, collaborative CRM applications utilize the social CRM technology customized to internal use (Deszczyński, 2018).

Social CRM emerges in many publications as an important CRM process (Hajli et al., 2017; Sheth, 2017). However, mere social media presence cannot be seen as the ultimate goal. The sustainability of online brand communities depends greatly on the ability to stimulate continued participation and commitment in community life (Wirtz et al., 2013). Social media proficiency also includes the ability to generate and integrate customer knowledge in omni-channel dialogue process (social profile data enrichment) (Choudhury & Harrigan, 2014) and sentiment research (Simkin & Dibb, 2013).

The digitalizing efforts should not be left over to customer processes only. CRM champions are also expected to automate human resource management and knowledge management processes. Automation may improve employee hiring and selection thanks to HR portfolio management including the applicants, trainees, existing and ex-employees (Chang et al., 2013). Technology may also decentralize standard administrative procedures and improve employee satisfaction by introducing self-service (Marler & Fischer, 2013).

However, ICT is most effective when combined with other resources and processes (Zerbino, 2018). Successful CRM project management starts with the sponsorship of top-level executives. Hence, CRM system implementation has to be communicated not primarily as an ICT project, but as a vital part of corporate strategy and has to enjoy a constant interest of top management (Saini, 2010). This may involve actively using their authority to resolve disputes on crossing interests (Kotorov, 2003). A successful CRM project also needs a project manager, who is "… a combination technologist, business expert, drill sergeant, motivational speaker, politician, and psychologist" (Davenport, 2000, p. 184). Their responsibility includes managing communications and interaction with stakeholders participating in the implementation to ensure they create their own stake in a project and share knowledge required for optimal digitalization of business processes (Steel et al., 2013). Their active participation may greatly improve the

system adoption rate by delivering intuitive functions and by showcasing good system use practices (Vella & Caruana, 2012).

The detailed literature review led to the formulation of the questions applied in the empirical study (described in Table 3). These statements constitute a synthesis of what can be called mature IT governance in terms of CRM technology deployment and use. They describe diversified approaches to the functionality and successful implementation of CRM technology, as well as other ICT instances seen as elementary to achieving successful CRM system deployment. According to the hypothesis presented in the introductory part of this paper, such a mature approach to CRM technology should contribute to achieving a sustainable competitive advantage of firms.

Table 3
Statements Defining the Success of CRM System and Other Related ICT Instances

code	CRM systems
S1	When servicing customers, the employees use solely one system (one window), which supports the whole process and integrates all relevant customer data (a 360° customer view principle). Exemplary literature sources: Ahani et al., 2017; Harris et al., 2011; Zand et al., 2018
S2	The CRM system has significantly accelerated the reporting of customer frontline processes (including marketing processes) – there is no need for manual work on weekly or monthly reports. Exemplary literature sources: Keramati et al., 2010; Park et al., 2010; Trainor et al., 2014
S3	The company uses a central database (data warehouse), which: – integrates information produced by all customer data processing applications, – enables analytical work (for example, customer defection prediction). Exemplary literature sources: Erevelles et al., 2016; Hallikainen et al., 2019; Haenlein, 2017
S4	The CRM implementation and development project is: – coordinated by a project manager who understands the potential and the limits of information technologies, but they originate from a non-IT department, – actively supported by a member of the management board or a manager directly reporting to the board. Exemplary literature sources: Jelinek 2013; Saini et al., 2010; Steel et al., 2013
S5	The CRM implementation and development project engaged: – employees with high authority among future system users, – owners of processes to be digitalized. Exemplary literature sources: Davis & Golicic, 2010; Vella & Caruana, 2012; Pozza, 2018

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Table 3 – continued

code	CRM systems
S6	The company has prepared a detailed CRM business implementation plan (detailed = the report includes measurable benefits, for example, the improvement in marketing conversion). Exemplary literature sources: Alshawi et al., 2011; Kim et al., 2010; Pozza, 2018
S7	The company enriches the individual customer/partner data stored in the CRM system by their respective social profiles. Exemplary literature sources: Choudhury & Harrigan, 2014; Killian & McManus, 2015; Simkin & Dibb, 2013
code	**Other systems**
S8	The HR department uses a system which enables a search for candidates who have the characteristics and capabilities that match the requirements in current recruitments among: – present and former employees, – trainees and former applicants. Exemplary literature sources: Aliyu & Nyadzayo, 2018; Chang et al., 2013; Giannakis et al., 2015
S9	Thanks to access to an internal HR IT system, much of the everyday matters are dealt with by employees themselves (for example, taking holidays, settling business trip expenses, participation in training programs). Deszczyński, 2018; Marler & Fisher, 2013
S10	The employees use, on a daily basis, a knowledge management system which helps in the storage and search of: – know-what knowledge (facts, procedures, processes), – know-who knowledge (knowledgeable employees). Exemplary literature sources: Martelo et al., 2013; Menguc et al., 2012; Storey, 2007
S11	The company uses an IT system which enables informal communication among employees, based on social media-like tools (for example, chat, forum, blog). Exemplary literature sources: Lee et al., 2015; Men, 2014; Trainor et al., 2014

Source: This table was prepared by the author of this study.

2.3. Defining Sustainable Competitive Advantage

The definition of competitive advantage: "The above industry average manifested exploitation of market opportunities and neutralization of competitive threats" (Sigalas, 2012, p. 324) suggests its relative nature. Therefore, to assess whether a company is a high performer or not, it has to be compared to its rivals. In addition, competitiveness is not only about today's results, but about their sustainability. Hence, the question

examining performance that supplements the 11 statements presented in Table 3 applies short-term financial and market measures of competitiveness alongside with some long-term-oriented ones, focused on customer and employee value (Mauboussin, 2012). The short-term performance indicators describe a temporal financial or market success, which is necessary but insufficient condition to label a company as enjoying sustainable competitive advantage. By contrast, the long-term indicators reflect the positive effects of enduring relationships (Schertzer et al., 2013). Both types of indicators are given in Table 4.

Table 4
Short-Term and Long-Term Business Performance Indicators

code	Short-term indicators
PS1	The company has been steadily increasing sales or market share.
PS2	The company has been steadily hiring more employees.
PS3	The company has been steadily outcompeting the other firms in terms of revenues.
PS4	The company has taken over some of its competitors.
code	**Long-term indicators**
PL1	The company has been steadily outcompeting the other firms in terms of customer satisfaction.
PL2	The company has been steadily growing its loyal customer base.
PL3	The company has been a sought-after employer.

Source: This table was prepared by the author of this study.

The empirical research differentiates between the market leaders (top performing firms) and the remaining group of companies. In order to be qualified as a market leader, they had to report all but one short-term advantages as well as all long-term ones and descriptions. Alongside with the adopted hypothesis, the vanguard of surveyed entities should also report a mature approach to the deployment and use of CRM technology.

3. Materials and Methods

3.1. Grading Scale and Pooling Procedure

An integral part of any questionnaire is its grading scale. In this study, the respondents were asked to assess to what extent the statements provided in Tables 3 and 4 matched the realities of their organizations within the 0–10 scale. Score '10' meant that the given description was fully adequate

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to the situation in the firm, while score '1' meant the opposite. The other scores represented the shades of intermediary situations. Score "0" could be used if the interviewee was not knowledgeable in a particular field (McDaniel & Gates, 2015).

With the extremes clearly spread apart, the ten-point scale seemed to be more capable of differentiating between the truly important and peripheral descriptions of successful CRM implementation than the popular five-point Likert scale. Moreover, its explanatory power and nomological validity is higher than the Likert scale (Coehlo & Esteves 2007).

A related matter was the decision what score levels could be qualified as indicating the success of CRM technology deployment. In general, if questions applied in research questionnaires contain positive statements, the answers of the interviewees can serve their psychological interests (e.g. self-esteem and cognitive consistency) rather than reproduce objective facts. Such "positive illusions" could have resulted in a heavy common method bias (Martins & Kambil, 1999; Podsakoff et al., 2003). Therefore, only the statements rated 9 or 10 in every observation were found eligible to indicate successful CRM technology deployment. This decision is based on the assumption that these top answers (associated with easily understandable 90–100% levels) are less likely to be biased, as they clearly represent the ideal situation corresponding to the description provided in the question. Scores of 7–8 still provide much space for the interviewees whose performance is mediocre or poor but who want to view themselves in a positive way.

The sampling frame consisted of the population of all companies registered in Poland (approx. 3.5m entities). The used sample comprised 608 firms stratified by the main industries. As the study is positioned on the impact of CRM technology on business, the desired informants were non-IT managers The primary data collection method was the Computer Assisted Telephone Interview (CATI), conducted by an external provider. The response rate for this survey reached 13.1%.

3.2. Basket Analysis/Association Rules Mining

Given the explorative character of this study, instead of the usual SEM-based inference, a machine learning technique in the form of basket analysis/association rules mining was applied. The basket analysis focuses on finding non-trivial patterns within the answers of respondents, which are defined as $A \Rightarrow B$, where $A, B \in I$ and $A \cap B = \varnothing$. The subset of items A is called antecedent (left-hand side – LHS) and the subset of items B is called consequent (right-hand side – RHS). The symbol $\Rightarrow$ indicates the rule linking the item sets. By harnessing sophisticated mathematical algorithms, it offers simplicity and parsimony in data presentation without sacrificing the virtue of empirical adequacy (Hruschka, 2019). Unlike SEM, where it would be

necessary to build an ex-ante statistical model, the adopted method made it possible to avoid biasing the results with predefined aggregated vision of successful CRM software deployment.

The basic idea behind the basket analysis/association rules mining is the following:

Let $I = \{i1, i2, \ldots, ik\}$ be a set of k-binary attributes called items, where k denotes the number of attributes.

In a set of transactions (answers to questions), each transaction contains a subset of I, marked by an individual respondent's identifier.

Let $Tj = \{t1, t2, \ldots, tn\}$, where $Tj = I$ be a set of transactions, where n denotes the number of respondents.

The original field where the basket analysis/association rules mining was applied were studies on customer buying habits (thereby the name "basket analysis"). However, this method is also useful in analyzing even such complex phenomena like multilevel macro-processes (e.g., organizational strategy) and micro-processes (e.g., organizational behavior) (Aguinis et al., 2013; Aumann & Lindell, 2003).

4. Results & Discussion

In order to empirically test H1 and search for the link between successful CRM technology deployment and sustainable competitive advantage, basket analysis/association rules mining was conducted. The inference was powered by the 'R' system enhanced by the package 'arules', which facilitates mining of association rules and frequent item sets. The standard quality levels of three different notations: support (0.5), confidence (0.9) and lift (1.25) were applied. The outcome was striking: no association rules could be computed either in the group of market leaders or in the remaining group of firms. This means that there is no pattern of achieving excellence in the deployment and use of CRM technology (not enough examples of clear success stories marked with 9–10 answers) among any group of the surveyed firms. In turn, CRM technology cannot be a decisive factor behind the sustainable competitive advantage of leading companies, as they have achieved their superior position without being highly successful in this field.

However, even if H1 is refuted, there could be a possibility that although the deployment of CRM technology by market leaders falls behind the expectations, it clearly differentiates between them and the average-performing companies. To test this working hypothesis, an analysis of the mean outcomes in both groups was conducted (see Table 5).

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Table 5
Means for Variables S1–S11 Computed for the Empirical Results

S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
24 top performing companies										
7.35	7.00	6.61	6.61	6.65	5.44	4.53	5.50	4.15	4.63	6.29
Remaining group of surveyed companies										
6.91	6.03	5.49	4.37	4.81	3.68	2.78	2.55	3.15	4.76	5.38
Difference between calculated means in percent										
6%	14%	17%	34%	28%	32%	39%	54%	24%	-3%	14%

Source: This table was prepared by the author of this study.

What comes as another surprise is that the proficiency in deploying CRM technology does not clearly differentiate between top performing firms and the average ones. Although the market leaders scored better than their less successful rivals in 10 out of 11 variables, still these differences are relatively low in the case of four variables (S1, S2, S3, S11) and one of them (S10 – knowledge management) is statistically even better applied by the average performing firms. Moreover, variables S1–S3 have the greatest importance when the core success of CRM technology is concerned. They describe the key benefits of CRM technology that a company can capitalize on. Implementing the 360˚ customer view principle (S1) enables seamless management of customer experience process regardless of contact touchpoint. Automated reporting (S2) enhances data quality and improves system adoption rate by its frontline users. Central database (S3) enables big data deep profiling and predictive analytics. The scores of these three variables reported in the survey were among the highest, although the ceiling was set by S1 at 7.35 points – which is far below the excellence level of 9–10 points and was also mirrored in the failure to find association rules in the case of the basket analysis.

Variables S4–S6 were those where market leaders scored much better than the remaining group of companies. All of them describe an ideal CRM implementation process which should bring a successful business case: coordinated by a skilled project manager and supported by an executive sponsor (S4), powered by an engaged and experienced team (S5) and devoted to achieving measurable business goals (S6). However, interestingly, it seems that the application of these good practices that is better than in the average benchmark of firms but still partial does not automatically guarantee achieving correspondingly better CRM software deployment, as showcased by variables S1–S3. Or, better to say, there is no sharp difference between mediocre and poor alignment of CRM implementation processes to the

recommended standards. After all, fulfilling only 45%, 55% or even 65% of the requirements is likely to result in diverse problems in quality, timing and cost management of any project, as much as 90%–100% performance in managing firm organizational and IT resources and capabilities is likely to produce a working and business-oriented solution (Suoniemi et al., 2021).

The description in question S7 depicts an advanced CRM system capability that enables the integration of the usual customer accounts based on data provided by firm-owned sources of information (including own ERP and SFA systems, e-commerce and other customer front-ends) by data obtained from private social profiles of the customers hosted in external applications. Variable S9 deals with an HR IT instance enabling employee self-service in standard administrative matters. What links them is that they represent the field where market leaders reported much better scores than their less successful counterparts, still achieving drastically low performance (below 5 points). Therefore, it is not reasonable to stipulate that these IT instances could have positively impacted their market performance.

The land-slide victory for the leading companies can be attributed to variable S8 – HR portfolio management. Although the nominal result (5.5 points) is very modest, it may be an interesting point that sets the path in looking for the characteristics that significantly differentiate market leaders from the average performing firms. However, with respect to relatively simple IT architecture that is required to run employee databases, it seems that the difference may be located more in the organizational core (e.g., treating employees as most valuable resource) than in technologies. In general, low to very low scores in the case of most variables, on one hand, and minimal differences among variables defining the core of benefits of CRM systems, on the other, indicate that the domain of CRM technologies is not the field where the actual sustainable competitive advantage is achieved.

In consequence, not only was H1 negatively tested but the overall message of the paper has changed. Although modern companies cannot do away with CRM technology, it plays a secondary, supporting role and does not differentiate among firms in terms of business performance. In other words, companies become market leaders not thanks to CRM software implementations, because their implementation success is usually moderate to non-existing. Moreover, underperforming firms are not capable of elevating their position thanks to CRM technology, because in their case, its successful implementation is even more unlikely. Were these results similar in other 4.0 technology applications, this would mean that the technologically-driven success of any company was rather internally-driven (based on the internal capabilities to implement an IT tool) than externally-driven (based on the tool itself).

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5. Conclusions, Research Contribution & Limitations

The initial premise of this research was based on the assumption that the skepticism of many scholars who found no empirically-based evidence linking the deployment of CRM technology and competitive advantage (Bernd et al., 2005; Coltman, 2007; De Luca et al., 2020; Keramati et al., 2010; Kumar & Reinartz, 2018; Pozza et al., 2018) can be, at least partly, explained by a particular methodological choice they made – namely, by conducting their research without differentiating whether their informants represented market leaders or less successful firms. By dividing these two groups according to H1 it was hoped that, although underperforming companies may not report CRM success stories, the leading ones will do. To challenge the existing research, which is predominately based on SEM interference, not only a new policy towards the research sample was adopted, but also a novel statistical method (association rules/basket analysis) was applied.

The failure of this research, despite all measures taken, to uncover the link between competitive advantage and CRM technology acts as a double check of previous IT-skeptical studies. In turn, it contributes to the development of management science, by providing empirically-tested evidence for the background role of CRM technology in the corporate landscape and the overall poor performance in reaching the operational goals of CRM system implementations by any type of business entity. By applying the systematic literature review method, this paper also updates and synthesizes the theoretical foundations of successful CRM technology deployment and proves its validity (poor or mediocre CRM project management made it impossible to reap significant benefits attributed to this technology). At the same time, this is also a contribution to managerial practice, as it highlights key reefs that professional CRM project managers have to evade.

This study is limited with regard to the following aspects. The first limitation is its spatial positioning in the Polish market. Although it reaffirms the findings based on research conducted in other markets, it would be beneficial to repeat the same research model and methodology elsewhere. Second, it concentrates on one selected technology only. Therefore, it cannot be used as a strong reference for the overall assessment of 4.0 revolution and its impact on business performance. Therefore, more studies concerning other 4.0 technology applications are needed.

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