Electronic Customer Relationship Management Assimilation in South-Eastern European Companies – Cluster Analysis

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***Abstract*— This paper aims to investigate the factors influencing the electronic customer relationship management (e-CRM) assimilation in Southeastern European companies. With ICT innovation in mind, a conceptual model was developed, integrating three theories of innovative diffusion. Multivariate techniques, factor analysis, and cluster analysis were applied in order to reduce the number of variables and classify the cases. A discriminant analysis was taken in order to test the reliability of the clustering and to explore the clusters' characteristics. The relationship between cluster categorization and life cycle phases, along with the size of the firm, were all checked against contingency coefficients. When comparing cluster categorization, the research results showed that the significance of technical, organizational and environmental factors changed depending on the phase of the e-CRM assimilation. The results additionally showed that the degree of usage and diffusion of these technologies differs in small to medium enterprises compared to big enterprises. Owing to these findings, which have enabled us to provide insights into the ways in which contextual factors influence the e-CRM assimilation, theorists and practitioners can see the necessary patterns of action.**

***Index Terms*— cluster analysis, e-CRM assimilation, Southeastern Europe, innovation diffusion**

I. Introduction

ELECTRONIC customer relationship management (e-CRM) is an emerging strategy which is often carried out by companies seeking to remain focused on their consumers; provide good quality, long-term relationships; and achieve a business profit at the same time by adjusting their business strategies, organizational structure, business culture, technical platform, etc. Managers and researchers are aware that there are many benefits of accepting and using e-CRM [1]-[4], but that there are also numerous obstacles in its implementation [5]-[8]. Many studies have concluded that the reasoning behind this could be uncovered through the examination of the concrete objectives achieved thanks to e-CRM, and simultaneously by neglecting key factors on which the success of its implementation depends [9]-[11]. Regardless of the aforementioned conclusions, as far as the authors are aware, there are still no findings identifying the factors that provide an influence, specifically in the e-CRM implementation phase, that allows the process of adapting the technology to its routine to be successful. More specifically, as companies face different challenges during different stages of the system's introduction, the extent to which managers are aware of the problems related to the diffusion of IT innovations is an issue in itself [12], i.e. how rational are managers' decisions regarding the allocation of resources in different phases of the assimilation?

Based on this, the main goal of our study is to suggest, justify, and confirm a model through which the critical factors of e-CRM assimilation can be identified. This will serve as a guideline for companies intending to adopt this path and, after choosing this route, it will provide insights to facilitate the successful implementation of e-CRM.

There are many number of studies which deal with issues concerning the implementation of these technologies [13]-[16], however there are significantly fewer studies dealing with identifying the factors upon which the decision of acceptance depends [17]-[19]. To the authors' best knowledge, none of these study the alternate factors in different phases - from the initiation and introduction of e-CRM, through to the adoption of and routinization of its usage – prompting the authors to enrich the existing database of studies from this field.

Considering the existing insights into the available literature, one can see that empirical research studying the acceptance along with the diffusion of the e-CRM mainly seems to analyze technical, organizational, and environmental factors. As the framework of Technology-Organization-Environment (TOE) [20] has often been used when examining the factors influencing the adoption of new technologies [21], [22] it seems logical that the usage of this framework would expand into the area of the systems through which customer relations are managed [9], [17]-[19], [23], [24]. Nguyen and Waring [25] have concluded that, if one wants to put a larger emphasis on the role of the organizational skills of the company, the Diffusion of Innovation theory (DOI) [17] can be useful.

On the other hand, Hillebrand et al. [3] have concluded that competitors, the media, and other modernizers may force a firm to adopt e-CRM. With this in mind, the authors have decided that this research should also include factors related to institutional theory (INT) [26]. In other words, it would be useful to see how mimetic, coercive, and normative institutional pressure, which exist in the institutional environment, can influence the inclination of the company to adopt and later use

the e-CRM. Keeping in mind that none of these theoretical frames are impeccable [27], [28] and that the authors' desired to obtain as precise a model as possible for the adoption and diffusion of a technology, this study integrated these three theories and identified eleven factors through which to analyze the suggested problem.

Through the insights of existing literature, managers can gather information concerning the influence of the technical, organizational, and environmental factors involved when adopting or diffusing the system. However, the authors decided that it would not be a good idea to offer more findings that had been missed by existing literature. Firstly, if it were possible to group factors according to the e-CRM assimilation phase, then managers would be able to gather this data, which would enable them to create a plan of business activities for each phase individually. In spite of this, by knowing which factors require further attention in a specific e-CRM assimilation phase, managers could reduce the needless expenditure of resources necessitated by system implementation. Finally, as there are many factors involved in this analysis, a pattern of desired behavior could be established through the development of any sub-system of the information system. As a result of this, the authors have used factor analysis.

Through this paper, the authors sought to offer findings on the initiators of the adoption and diffusion of the e-CRM in companies in the countries of South-Eastern Europe (SEE). Trade policies and the facilitation of CRM practices are, in particular, one of the essential pillars of South-East Europe's 2020 Strategy. CRM is an e-CRM strategy strictly following the conception of the EU strategy of Europe 2020. OECD [29] identified progress in terms of the development of the application of information and communication technology (ICT) in all SEE countries.

The adoption of CRM is believed to increase marketing and sales performance by enhancing customer service and customer relationships. According to Eurostat data [30], approximately one in three enterprises use systems for operational customer relationship management and use software applications to manage their customer information for this purpose. However, statistical reviews indicate that there is a disparity in the extent of the use of these systems and a lag in SEE countries compared to other European regions. In other words, about 33% of EU-28 enterprises used CRM software applications in 2018, with the share amongst small enterprises (30%) comprising of around half of the amount recorded for large enterprises (62%) [30].

The fact is that, using a series of programs, action plans, and ICT strategies [31], the EU Commission seeks to reduce this type of digital gap in different European regions and, in particular, to help SMEs to increase their competitiveness through the use of these and similar IT solutions, allowing them to contribute to the creation of new working places, supporting overall economic growth. However, despite this, the situation is changing very slowly, year by year. Enterprises in SEE countries have been delayed in their acceptance of e-CRM applications in their work and are lagging behind the EU average. In terms of CRM software usage, none of the SEE countries are among the leaders in this area, whereas most of them, such as Bulgaria (18% of enterprises), Romania (13%), and Hungary (13%), have only just begun to introduce CRM software [31]. The most plausible explanation for this is the low implementation of cloud services in the SEE region. This indicates that the problems leading to the slow assimilation of IT innovations (including e-CRM) in SEE countries are systemic in nature and require deeper exploratory analysis.

On the other hand, as a large amount of research already exists in relation to the acceptance of the CRM by big companies, and a smaller amount exists for SMEs [32], [33], this research comprises both groups. Additionally, in focusing on a specific geographical region, the authors hope to provide findings which will further serve to confirm whether or not different regions have a tendency to create their own organizational arrangements which support IT innovations and IT practices, as some previous researchers have claimed [34], [35]. Usage increased for both types of CRM, regardless of the size of the enterprise. Overall, for many SEE countries, further progress can still be expected in terms of adopting both operational and analytical CRM in light of the potential benefits that customer-centric marketing practices can offer [30].

In accordance with the aforementioned motives and the observed disadvantages of previous reports, the objectives of this study are as follows:

(1) To identify factors influencing the initiation, adoption and routine usage of the e-CRM in South-Eastern European companies;

(2) To review the differences related to technical, organizational, and environmental factors according to the e-CRM assimilation stages and, with the cluster analysis in mind, to identify those with the greatest influence;

(3) To compare cluster categorization and show whether or not there is a connection between a company's size and its assimilation stage;

(4) To test our variables on South-Eastern European companies only;

(5) To check whether or not the integrated TOE/DOI/INT frameworks can serve as empirical analyses with regards to the acceptance and diffusion of e-CRM;

(6) To provide recommendations to managers and other decision makers in the field of ICT concerning the definition of desirable patterns of e-CRM adoption. Through this, managers can adopt e-CRM in more efficient ways in the future and decrease the number of projects with unsuccessful e-CRM implementation.

(7) To obtain conclusions pertaining to South-Eastern European companies.

The rest of the study is organized as follows: In order to analyze the suggested problem, literature concerning the diffusion of IT innovations and literature on the theoretical frameworks used to identify the factors of acceptance are explored in Section 2; the authors suggest a Research Model and Research Hypotheses in the third section; in the fourth section, the authors present their research methodology; the fifth section contains the research results, and elaborates upon the obtained findings; and, finally, concluding observations are shared, along with an overview of the implications of the

research, its limitations, and recommendations for future research.

II. Literature Review

In order to choose phases examining the influence of technical, organizational, and environmental factors, in the first section the authors provide a review of previous research based on the innovation diffusion theory. Following this, a review of the theoretical frameworks is given, showing empirical support for research dealing with organizational acceptance and the expansion of IT innovation.

A. Theoretical background, considering different phases of innovation diffusion

Numerous studies regarding ICT are based on the innovation diffusion theory developed by Rogers [36], wherein the diffusion of technological innovation is considered to be a product of its expansion, using new methods, processes, and technologies. More specifically, Rogers [36] claims that the adoption of these innovations must always be regarded as a process that is carried out through a range of phases. This process must stem from knowledge, i.e. awareness of the innovation, and must continue through the decision of adopting, concluding with its full implementation. Alsaad et al. [37] fulfill this by clarifying the meaning of this implementation, asserting that we can discuss implementation only when the innovation completely adjusts to organizational processes and is carried out in the company. As e-CRM is regarded as a technological innovation, successful adoption does not necessarily lead to regular use [38], [39]. The authors believe that this theory deserves to find its stronghold in research dealing with the e-CRM diffusion.

Although no precedent exists regarding the phase names, the authors review the assimilation of ICT innovations through three phases [40]-[49]. These phases all treat innovation assimilation as a degree to which innovation is accepted, expanded, and turned into routine usage. Thus, Ko et al. [40] identify three phases of innovation diffusion by exploring the relationship between the organizational characteristics of some companies in the Korean fashion industry and the process of e-CRM adoption. They consider the perception of e-CRM, its adoption, and finally its full implementation. Similarly, in the context of RFID technologies, Hardgrave et al. [45] introduce the term assimilation hierarchy and, in this way, identify differences between the three hierarchical levels. According to these authors, introducing the technology constitutes the base level; the level of understanding technology comes after that, and technology starts to create business value in the third level. Bose and Luo [49] do not agree with these assertions and, by studying Green IT initiatives via virtualization, they claim that there must be an initialization phase prior to the introduction of technology, after which technological integration joins the existing system, finally resulting in its recurrent use.

Relying on the findings of Meyer and Goes [46] who regard innovation assimilation through three primary phases: the knowledge-awareness stage, the evaluation-choice stage, and the adoption-implementation stage, Jie and Sia [47] base their research on processes of assimilation by supply chain participants in China on three phases: initiation, adoption, and routinization. They point out in this study that companies are aware of the innovation of the first phase and evaluate its potential implications on the company. After the initiation phase, they make decisions on the allocation of resources so that radio frequency identification (RFID) is accepted and, finally, in the third phase, RFIC is used routinely in all company activities. Similar to this, especially in terms of furthering existing research models based on the dichotomy between adopting or not adopting the system, Junior et al. [41] use a diffusion model, which is also based on three phases: Evaluation, adoption, and routinization. With this three-phase approach, they prove that information sharing can facilitate a successful ERP system implementation, but only if they recognize the diffusion phases of this technology.

Chong and Chan [43] also used evaluation, adoption, and routinization in order to study the diffusion of RFID in the health care industry, based on structural equations for multiple phase analysis. This approach was applied later when studying the diffusion systems of managing mobile supply chains [48].

In analyzing the findings obtained from the aforementioned research, it is obvious that a three-phase approach has empirical support in studies in terms of accepting and using technology, and it is therefore relevant for the needs of this study as well; particularly as existing literature shows that the previous efforts of the academic community were either directed primarily to the problem of CRM adoption [11], [24], [50] or to the problem of CRM post-adoption [51]-[53]. The aim of this study is to fill that gap.

B. e-CRM assimilation following TOE, DOE, and INT frameworks

A more complete picture of the diffusion of this type of IT innovation can be seen when observing the factors influencing the e-CRM diffusion. In order to examine the influence of technical, organizational, and environmental factors, the authors studied theoretical frameworks which had empirical strongholds in research on IT diffusion and concluded that there was a difference with regards to choices, depending on whether or not the study examined organizational adoption or dealt with the investigation of adoption and usage by the individuals (for example, employees or consumers). As the focus of this study is on organizational adoption and the expansion of e-CRM on a theoretical basis, the authors used studies that utilized individual or combined theories that had empirical support for the organizational adoption and expansion of IT innovations.

Taking into consideration the characteristics of e-CRM and the results of previous research, the authors think that the TOE framework [20] is appropriate when studying the factors which influence e-CRM assimilation. This framework covers three groups of factors which influence the acceptance and usage of a technology: 1) technological context, which involves existing and new technologies as well as the internal and external technologies a company uses; (2) organizational context, which

relates to the specific characteristics of a company, including the size and volume, managerial structure, and the quality and degree of available resources; and (3) environmental context, which represents an area in which a company does business [20].

As this framework proved to be a good representation in studies related to CRM [9]-[11], [18], [22] the authors decided to carry out this research with the TOE framework. By applying AHP methods and the TOE framework, Amelina et al. [9] ranked key factors which influence the adoption of Social CRM (SCRM). Based on this framework, Hung et al. [11] conducted research on key factors of successful CRM acceptance in Taiwanese health care institutions and the ways in which they offered health care institutions, CRM system providers, the government, and researchers constructive suggestions which could contribute to an increase in the probability of their adoption. Similar to previous authors, Racherla and Hu [18] used confirmatory factor analysis and structural model assessments in order to develop a research framework which measures the development of technical, organizational, and environmental factors when adopting e-CRM in the catering industry. These studies, although useful in theory and practice, keep the volume of the research strictly within e-CRM acceptance as a technology. In comparison to these, a deviation in approach was made by Lin [10], who studied acceptance factors as well as factors important for e-CRM initiation. According to the authors, there are no studies based on the TOE framework, which determines the factors through which innovation can turn into routine usage, i.e. whether or not it will be used at full capacity.

In identifying the need for the TOE framework to be expanded, along with the determinants of other theoretical frameworks, the authors frequently combined it with the DOI framework [14], [21], [54]. As the DOI framework proved to be useful when it came to investigating the influence of the characteristics of some technology on its acceptance and usage later, it was included in this conceptual model. According to this framework, Hasani et al. [17] developed a conclusion that argued that the compatibility volume of SCRM with existing systems within the company and systems used by customers were meritorious for its acceptance. By studying the degree of accepting web-based CRM software in companies, Wu and Wu [55] show that it depends on perceived usage of the ease of using this technology. As the authors sought to include certain characteristics of e-CRM as a technology in the group of examined factors for the purpose of this research, the study will be based on the DOI framework as well.

Finally, triggered by the claim that "Institutional factors are ubiquitous and essential components in understanding and explor[ing] IT innovations that cross organizational and firm boundaries" [56] and that the findings in previous literature are so different that they contribute to the absence of generalized conclusions [57], the authors also added factors from the INT theory to factors from the TOE and DOI models.

III. Theoretical Development

A. Research model

Available literature from the field of IT diffusion, assimilation, and IT innovation justifies the creation of the conceptual model, which will serve to test the impact of technical, organizational, and environmental factors in various phases of e-CRM assimilation. Also, based upon the same model, it is possible to examine whether or not a company's size can be related to its assimilation phase.

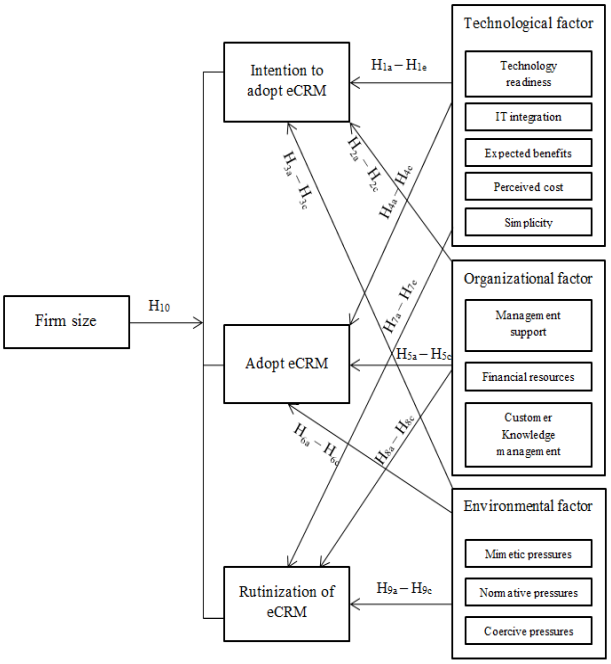

Fig. 1. Conceptual model of research

In order to define the hypotheses, based upon the results of previous research, the authors outlined 11 attributes (5 from a technological context, 3 from an organizational context and 3 from an environmental context) for which it was necessary to determine the difference in the measures of influences in various phases of e-CRM assimilation.

1) Technological factors

Technological factors pertain to the technical characteristics of ICT systems and the suppositions of its usage. It depends on them as to whether the decision on e-CRM adoption will be made, but also the decisions in periods upon adoption of this technology. The adoption of e-CRM anticipates the existence of the necessary IT infrastructure, IT integration, and IT expertise which commonly constitute technological readiness [58]. An IT infrastructure consists of existing hardware-software, network platforms, and databases [58]. IT integration is defined as the measure of the compatibility of the informational system (IS) with the existing business processes and existing informational systems [59]. Information flow in

the value chain is not possible unless there is compatibility between the e-CRM platform and the existing internal and external IS [48]. IT expertise is measured by human resources' ability to contribute to the development and quality of usage of informational systems [60], [61]. It seems logical that a higher level of technical readiness would assist e-CRM in becoming an integral part of the value chain more quickly.

Expected benefits have been recognized many times as a factor influencing the adoption of IT innovations [48], [54], [62], but also as a factor which further influences the diffusion of IT innovation [63]. Existing literature demonstrates that the cost can be a hurdle or break with aim to initiate and/or for adoption of the innovation [48], [64]. Furthermore, the complexity of the system has been recognized many times as a variable, which accelerates the process of decision-making with regards to the adoption of new technologies, however it also contributes to uncertainty regarding further implementation [54], especially in the SME [38].

Technological readiness, IT integration, expected benefits, perceived cost, and simplicity are being reviewed within the technological context of this paper.

2) Organizational factors

Organizational factors cover company attributes which can influence decision making when it comes to the adoption and further usage of e-CRM. Previous studies on IT innovations, abound with conclusions from the group organization factors that managers influence the adoption of IT innovations through their decisions [9], [21], [22], [50] and encourage further usage [53], [58], [65]. Furthermore, companies that have no problem financing IT innovations and are financially more ready can be seen to make the decision to introduce the system more easily and have less problems in later phases of its implementation [18], [61]. Regardless of the management support and level of financial readiness, the companies which do not have the ability to manage customers' knowledge find it more difficult to accept e-CRM [11], [18].

Taking into account the conclusions of the aforementioned studies, within the framework of an organizational context, the authors have suggested the following factors: management support, financial resources, and customer knowledge management.

3) Environmental factors

As the aim of institutional theory is to focus on environmental factors which can have a crucial role when making decisions on innovation adoption, the authors decided that mimetic, normative, and coercive pressures could serve as variables when analyzing problems related to e-CRM assimilation. Companies decide upon a specific IT innovation in case it has been adopted by other companies in the same industry. This is in order to avoid the risk of being deemed a non-innovative company, but also to limit the number of companies that are successful owing to the adopted innovation [64]. There are normative pressures when a company accepts the attitudes, recommendations, and initiatives of other companies, professionals, or competent associations [3]. Unlike normative influences, forced influences come from those that the company depends on. As previous researchers have shown [3], [60], these pressures can be expected from regulatory bodies, dominant organizations, parent corporations, business partners, etc.

Taking into account the literature review and the results and objectives obtained and outlined in this research, mimetic, normative, and coercive pressures have been analyzed within from an environmental perspective.

B. Hypotheses development

After reviewing previous research, it became evident that there was no unique opinion concerning which group of factors was crucial to certain phases of assimilation in IT innovation. It is clear that the peculiarities of various IT innovations, as well as the specific different assimilation phases of IT innovation, result in different measures of influence for the analyzed factors.

1) Initiation to adopt e-CRM

In previously conducted research, no unique opinions are given with regards to the significance of the factors upon which the decision to adopt IT innovation depends. Thus, by researching the factors affecting the adopting of this computing decision, a group of authors [66] have proven that the volume and capacity of the technological context are the most important attributes when the company makes the decision to pursue IT innovation. On the other hand, in terms of Rogers's theory of innovation diffusion [36], Cooper and Zmud [67] argue that, in the starting phases of the initiation of adoption, some innovations are key organizational factors, external forces or both groups of factors which act combined, and consequently in this phase technical factors are not crucial. They argue that all technical factors are significant only in the next phase - when it comes to the acceptance of the innovation. The authors [36], whose study aimed to cover the importance of technological, organizational, and environmental factors in the initiation phase of adopting technologies for the implementation of the eXtensible Business Reporting Language (XBRL) standard, offer findings which are different from previous research in that they prove that, in the phase of initiating and adopting innovations, all factors are important but external factors are the most important. Purvis et al. [68] do not dispute the importance of the technical factors in the phase of adopting innovation, but they claim that, in this phase, the organizational factors are still the most important factors as they ensure the adoption of the technology. They do not question the fact that, without technical components, it is more difficult to initiate the introduction of the new technology, they simply point out that its existence would be "deadened" without strong organizational support. On the other hand, Teo et al. [64] claim that technology and organization would be impossible to develop if there were no external factors influencing the process

of initiating innovations. This heterogeneity of findings particularly justifies the aspiration of searching for new findings from which one could observe the measure of influence of these factors, i.e. grouping depending on the phase in which each group has the biggest influence.

With regards to groups of technical factors, a number of authors studying IT innovations proclaim technological readiness to be the most important facilitator in initiating the adoption of that technology [69], [70]. Both factors of technological readiness and factors of IT compatibility represent inevitable elements of research designs for numerous studies on IT innovation. However, these findings mostly show that companies do not dwell too much on the problems of IT integration in the phases of initiation and introduction [71]-[73].

Further considering technological factors, Quinton [74] proves that the need for innovations is mostly triggered by the desire to achieve certain benefits and/or the desire to improve knowledge management capabilities. Similar to the studies of previous authors, Chan et al. [71] prove that, in the initial innovation phase, there is a crucial need to reduce costs.

When analyzing organizational factors, Lee et al. [75] asserted that the attitude of management towards IT innovation is crucial for the majority of companies brave enough to introduce it. However, although the e-CRM utilizes business and management philosophy, Kumar and Reinartz [76] surprisingly came to opposing conclusions according to which managerial support was absent in the phases of long-term decisions on its adoption. In other words, the outcome of the technology adoption frequently depends on financial attributes rather than managerial support. This could be a possible reason why Kurnia et al. claim that [77] the financial capability factor is more important than the factor of managerial support in the phases of decision prior to adopting the technology.

Institutional environments produce institutional pressures which somehow force companies to adopt and use IT innovations [78], [79]. The level of influence of these factors is dictated by companies' perceptions of pressures, types of institutional pressures, and the position in which a company stays in terms of assimilation processes [80]. The authors reviewed institutional pressures through forced, normative, and mimetic pressures for the purpose of this study. DiMaggio and Powell [78] defined forced pressures as formal or informal pressures that companies suffer as a result of those they depend on. It is expected that buyers and competitors will encourage the companies to initiate e-CRM adoption.

Normative pressures evolve when institutions, such as the government, organizations for standardization, or various political and industrial associations, force the company to adopt a new technology. In the context of e-CRM, these pressures can exist even in this phase, but they will definitely have a larger impact in the phases that follow. As Shi and Shambare [81] claim, we can expect a somewhat bigger influence of mimetic pressures in this phase. It is possible that some companies will look up to other ones in their field, in the same market, or in a similar economic position, etc. and will consider adopting technology that has already been adopted by another company.

With regards to this, the authors have outlined their hypotheses H1- H3 and the sub-hypotheses related to them (H1a-H1e, H2a-H2c, H3a-H3c, which can be seen in Table I).

H1: There is no equivalent influence of all technological factors in the phase of intention to adopt e-CRM

H2: There is no equivalent influence of all organizational factors in the phase of intention to adopt e-CRM

H3: There is no equivalent influence of all environmental factors in the phase of intention to adopt e-CRM

2) e-CRM adoption

In the phase when the innovation is adopted and starts to be used, it is not enough that the company is technologically ready. More specifically, the adopted e-CRM system, apart from its basic possibilities (to collect, process, and save data), owing to its integration with other systems, must provide improved ways of better understanding users' behavior, improved possibilities of building more efficient communication systems, and the possibility to develop predicative models [82]. This means that there are expectations that, out of all technical factors, the factors of technological readiness and IT integration should be equally significant.

The expected benefits factors were shown in some studies to be significant in the phase in which the adoption of technology is being initiated whereas, in others, this occurred only in the phases when the technology had been accepted. Thus, Roh et al. [83] claim that this factor is crucial only when there is a decision to be made on the type of RFID application to be introduced, while Martins et al. [84] consider the significance of this factor only in the phase when Software-as-a-service (SaaS) is adopted.

In this phase, due to the need to simplify working practices and speed up working processes, the factor of simplifying the need of using the system has been recognized as a decisive factor when adopting IT innovations [85], [86].

In terms of organizational factors, managerial support has been identified as a key factor with a significance that grows with the level of usage and the complexity and sophistication of the system being used [87], [88]. As all sophisticated concepts, including e-CRM, require significant financial investment in the process of implementation itself, the factor of financial resources is treated as an important one in the phase of adopting IT innovation [16], [25]. Furthermore, companies that have cultural i.e. practice of efficient managing of consumers' knowledge will speed up the e-CRM adoption [18].

Existing literature has shown that the external environment can (by means of incentives and/or pressures) be significant in a company's decision to adopt a new technology, but that it does not have to be a significant factor when it comes to further use of the system [58], [71].

With regards to previous findings, the authors have outlined these hypotheses H4-H6 and the sub-hypotheses related to them (H4a-H4e, H5a-H5c, H6a-H6c, which can be seen in Table I).

H4: In the phase when e-CRM is adopted influence of technological factors are not same

H5: There is equivalent influence of all organizational factors in the phase when e-CRM is adopted

H6: None factor, from the group of environmental factors, has influence in the phase when e-CRM is adopted

3) e-CRM routinization

Zhu et al. [42] claim that technological readiness is especially important in later phases of IT assimilation because a life cycle of the development of IT systems cannot be circled without the strong influence of this factor. Despite this, in this phase, a full integration of the new system with the existing internal and external system must be expected [71]. Only in that way can the full capacity of the e-CRM be used and reviewed [89]. In this phase the expected benefits should not play any significant role [80], neither should the simplicity of the system's usage, because the employees have already been trained for its use during the previous phase.

In the phase of organizational adjustments, it is important to emphasize that the difficult transformation from adopting to the later routine use of the system can be worsened if there is no strong managerial or financial support [39]. Companies which do not have these attributes will be less likely to enter the phase of routine system use [71].

As far as environmental factors are concerned, although Liang et al. [90] offer proof that, when using enterprise resource planning (ERP) systems, it is important to focus on institutional or environmental factors in order to circle the assimilation process and achieve the benefits, Kamal [91] believes that this conclusion cannot be generalized, especially when we take sector differences into account. Namely, he points out that public companies do business with more legal limitations, they fulfill political missions and have stronger public responsibility and so, in later phases of the assimilation of IT innovations, environmental factors must be a strong influence in a way that would not be the case for other companies [58], [71]. Furthermore, as the application of the system has already started, mimetic and coercive pressures are not expected.

With regards to previous findings, the authors have created hypotheses H7-H9 and the sub-hypotheses related with them (H7a-H7e, H8a-H8c, H9a-H9c, which can be seen in the Table I).

H7: There is equivalent influence of all technological factors in the phase of routine e-CRM usage

H8: There is equivalent influence of all organizational factors in the phase of routine e-CRM usage

H9: No factor from the group of environmental factors has an influence on the phase of routine e-CRM usage

4) Control variable

Company size is taken in relation to the level of a company's readiness to invest in innovations and its degree of endurance to keep up with the failure of their adoption [36]. Liang et al. [90] suggest that, in the studies of assimilation of IT innovations, a company's size is always used as a controlled variable because bigger companies have more responsibilities towards the client and more of a readiness to show them attention through the use of IT innovations, and these findings can be significantly different from those which exist for SME.

We should not neglect the fact that companies of various sizes recognize the difference in organizational potential during the initiation of accepting and adopting IT innovation, which is especially noticeable through the size and structure of the company's IT department [61], but also through the scope of activities which make up the company's various assimilation phases [42].

Some researchers have proven that larger companies strive towards initiating IT innovation adoption and that they find their way in later phases more easily. Hitt et al. [92] attribute this to multiple levels of bureaucracy and "long decision chains", which contribute to delayed reactions, interrupting the process of decision making when adopting IT innovations. Big companies, as Goodhue et al. observe [93], can have a larger number of inherited information systems, which can complicate processes when in the phase of adopting a new system.

In analyzing the assimilation phases of e-business, Zhu et al. [42] believe that bigger companies can struggle to reach the routinization phase because they have issues when it comes to adjusting the organizational structure for new IT projects. In the existing field of research on e-CRM, previous researchers have proven that the degree of adoption is not the same for SMEs and bigger companies, and that SMEs tend to lag behind the larger companies, and that they also have a somewhat higher number of unsuccessful projects of adoption [4]. By accepting the previous findings, the authors defined hypothesis H10.

H10: There is a relationship between a firm's size and its assimilation phase.

TABLE I
DEFINED HYPOTHESES AND SUB-HYPOTHESES

Factor	Variable	Impact on intention to adopt e-CRM	Impact on adopting e-CRM	Impact on e-CRM routinization
Technological		**H1**	**H4**	**H7**
a1	Technology readiness	H1.a +	H4.a +	H7.a +
a2	IT integration	H1.b -	H4.b +	H7.b +
a3	Expected benefits	H1.c +	H4.c -	H7.c +
a4	Perceived cost	H1.d +	H4.d -	H7.d +
a5	Simplicity	H1.e -	H4.e +	H7.e +
Organizational		**H2**	**H5**	**H8**
b1	Management support	H2.a -	H5.a +	H8.a +
b2	Financial resources	H2.b +	H5.b +	H8.b +
b3	Customer Knowledge management	H2.c -	H5.c +	H8.c +
Environmental		**H3**	**H6**	**H9**
c1	Mimetic pressures	H3.a +	H6.a -	H9.a -
c2	Normative pressures	H3.b +	H6.b -	H9.b -
c3	Coercive pressures	H3.c -	H6.c -	H9.c -
Firm size		**H10**		

Source: Authors

IV. METHODOLOGY

A. Sampling and data collection

Keeping in mind the defined hypotheses, the results of previously published research on the diffusion of IT innovation and IT assimilation, as well as assessments of theoretical models, the authors developed a questionnaire. The creation of the questionnaire was preceded by two pilot survey iterations, which sought to examine the validity of the content of the initial questionnaire.

The questionnaire has been prepared in English and was forwarded to 5310 e-mail addresses of companies operating in South-East Europe (Montenegro, Serbia, Croatia, Slovenia, Bosnia and Herzegovina, Bulgaria, Romania, Macedonia, and Greece). The sample was obtained using non-probability sampling, specifically convenience sampling wherein the selection of the companies is done according to the base of enterprises gathered from the chambers of commerce of the researched countries. The questionnaire was accompanied by a letter in which the authors explained the goals of the study, asking for the questionnaire to be filled in by IT and marketing sector employees and committing to the protection of the anonymity of the respondents and companies. The poll lasted for 90 days and 1311 fully filled-in questionnaires were returned, giving a response rate of 24.68%.

The poll contained 34 questions which served to define 11 variables which covered technical, organizational, and environmental factors from the integrated TOE, DOI, and INT framework (Appendix 1). The authors took the number of employees (up to 250, or over 250) as a criterion, which complied with a key criteria of the European Union when categorizing the companies. Above of those 34 questions, there were 2 additional questions related to 1) the company's size and 2) for the e-CRM life cycle phase in company (initiation, adoption and routinization).

In order to estimate the influence of the analyzed factors in certain phases of e-CRM assimilation, respondents answered using a seven-degree Likert scale, i.e. answers to each item ranged from "(1) I completely disagree" to "(7) I completely agree" [61].

For the needs of this study, and in compliance with the defined hypotheses, the authors used attitude variables; applied principal component analysis (PCA) to restrict the attitude variables; ran a hierarchical cluster analysis using Ward's method of amalgamation; ran a non-hierarchical k-means cluster analysis to identify groups of enterprises; profiled the groups of enterprises with a discriminant analysis; and checked the relationships between groups with enterprise size and phase of life cycle by applying chi square.

B. The Cluster Analysis

A cluster analysis is a group of multivariate techniques aimed to classify objects (e.g., respondents, products) into natural groups according to the characteristics they possess and the relationships between them [94]. Researchers choose characteristics and they become the cluster variate, a mathematical representation of the selected set of variables which compares the objects' similarities. The main aim of this analysis is the objective reduction of the information from an entire sample to information concerning specific groups that will allow authors to analyze data more systematically and reveal relationships that could not be done other way.

The hierarchical cluster analysis generates cluster solutions starting with each observation as its own "cluster" and then

agglomerating two clusters at a time until all observations are in a single cluster. The simplest structure is achieved and the procedure of further agglomeration should stop before the large group increases in heterogeneity. The clusters should exhibit high within-group homogeneity and high between-group heterogeneity. Out of various hierarchical methods, the authors chose the Ward method (the minimum variance method) as the most appropriate for quantitative variables [95]. This method belongs to the group of hierarchical methods which specify the cluster centers. It is based on the decomposition of variance [94]. In this method, the similarity used to join clusters is calculated as the sum of squares between the two clusters summed over all variables. The Ward objective is to find, at each stage, the two clusters whose merger gives the minimum increase in the total within group error sum of squares for the collection of clusters. Alternatively, the between-class variance of the partition obtained is to be maximized. This method has the tendency to result in more balanced hierarchies and clusters which satisfy compactness and isolation criteria with approximately equal size [94]. The authors also used non-hierarchical k-means clustering methods in order to confirm the stability of the clusters. The k-means method in the initial phase requires the specification of the number of clusters to extract and it is usually based on previous analysis [96]. In the next step, k-means randomly assigns all objects to the clusters. In the further analysis, k-means successively reassigns the objects to other clusters with the aim of minimizing the within-cluster variation. This within-cluster variation is equal to the squared distance of each observation to the center of the associated cluster. If the reallocation of an object to another cluster decreases the within-cluster variation, this object is relocated to that cluster. Assumptions for the application of cluster analysis are not as rigorous as in other multivariate techniques, but they do require that the sample represents population, variables are not correlated, and there is absence of outliers. It is also important that selected clustering variables satisfy theoretical, conceptual, and practical considerations.

C. *Strategy "factor–cluster segmentation "*

In order to get a clearer picture of the segmentation of firms in adopting strategies, the authors used the widely used procedural strategy of "factor–cluster segmentation" [96]. This is also used in the article that led to the conceptualization of this work [97]. Firstly, the factors on the questionnaire should be determined, and secondly, companies are clustered in terms of their utilization of factors as cluster variates. In the next step, discriminant analysis is used for profiling in order to explain the model and ensure that it will help the authors to assign new companies to clusters based on the results of the variables [96]. Further interpretations of the solution were made by comparing clusters on the initial set of variables and characterizing each cluster using the chosen criterion variable. This strategy is sometimes criticized because the clusters are identified by their transformed values solely on extracted variance, leading to the loss of the original information. Another very important issue is that the use of factor analysis excludes the variables that truly discriminate between the underlying groups [94]. The interpretations of clusters based on their original variables can be questionable, given that these clusters were constructed by using factor scores. Some studies have shown that the factor-cluster segmentation reduces the success of finding usable clusters significantly [98]. However, it is often a useful procedure in avoiding collinearity, which can result in overestimated weights and skewed final solutions [96].

V. Results And Discussion

Multivariate techniques factor analysis and hierarchical cluster analysis were applied in order to reduce the number of variables and classify the cases, respectively, and a canonical discriminant analysis was undertaken in order to test the reliability of the clustering and to explore the characteristics of clusters. The relationships between the cluster categorisation and the phase of the life cycle with the size of firm were checked with contingency coefficients.

A. *Reducing the variables with Factor analysis*

Factor analysis was applied in order to reduce the number of variables and explore the main influencers of the factors analyzed on e-CRM adoption and use. The authors used the Principal Component Analysis (PCA) as an extraction method to 34 items relating to 11 factors which covered technical, organizational, and environmental factors from the integrated TOE, DOI, and INT framework factor analyzed using principal component analysis with Promax (oblique) rotation and Kaiser normalization. Only numerical variables were used with a range of seven. The assumptions regarding the ratio of the number of respondents and variables, the measurement level of variables, and the variability of variables were satisfied. Measures of Sampling Adequacy for the overall data set (Kaiser-Meyer-Olkin=.87) and the MSA measure for each individual variable were satisfactory (larger than .70). Bartlett's test of sphericity showed that the data was suitable for data reduction ($\chi^2(df=55)=8342.30$, $p<0.01$). As the determinant was 3.339E-10 there were no problems with regards to multicollinearity. The inspection of scatterplots revealed that variables had linear relationships. However, an Omnibus test of multivariate normality indicated that the data did not have normal multivariate distribution. This was probably caused by its sensitivity to large samples. There were no significant multivariate outliers.

Using Cattel's scree test, the authors decided to keep four factors (Figure 2). As a result, there was a reduction in the total amount of information, down to only four factors, explaining 54.060% of the information provided by the initial variables.

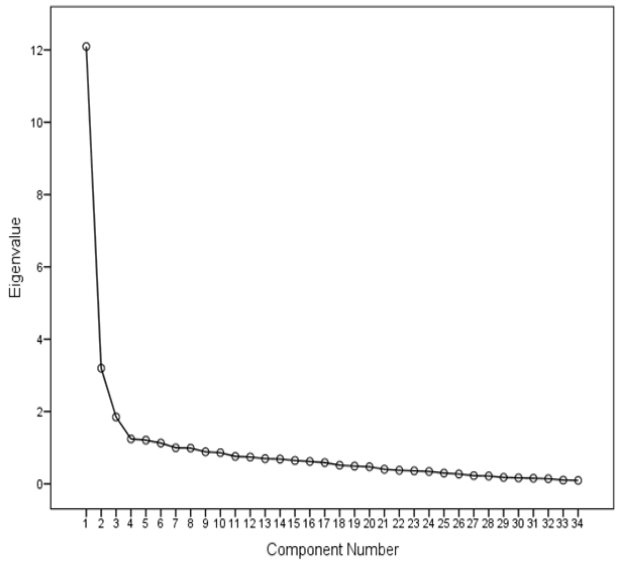

Fig. 2: Cattel's scree test
Source: Authors

The next step was to analyze the factors' structures and interpret the contributions of each item in relation to them (Table II). Factors were labeled according to the items with the highest and most significant loadings. The first factor named was Technology, the second was Coerce, the third was Mimetic, and the fourth was Organization.

A higher score under the bipolar Technology factor meant a higher technological readiness, a higher expectation of benefits, a larger perceived cost and complexity, but a lower IT integration. A higher score under the Coerce factor meant higher readiness to meet customers' expectations and regulatory related to accepting and using e-CRM. A higher score under the Mimetic factor meant higher recognition that the environment invests in the development of e-CRM. A higher score under the Organization factor meant greater managerial support and larger financial resources.

Correlations between rotated factors were in the range of 0 to .452. The largest correlation was between the factors of Technology and Coerce.

The structure of responses obtained did not entirely corrrespond with the anticipated structure of the questionnaire. Items designed to measure environmental influences created two factors: one focused on the Mimetic and other on Coercive influences. This indicates that they have essentially different influences on the assimilation of e-CRM. Two items from the subsale that aimed to measure organizational factors in the field of customer knowledge management were deployed in the Technology category. Both of the items focused on the importance of human resource capacities and were negatively correlated with the Technology factor. This indicates that respondents recognize Technology as an autonomous human resource.Two items that should belong to the Technology factor - "Accepting and using e-CRM depends on the expectations with regards to the increase of the quality of the customer support service" and "Accepting and using e-CRM depends on the expectations with regards to the strengthening of the image of an innovative company" - were significant in terms of the Organization factor.

TABLE II
EXTRACT FROM THE PATTERN MATRIX WITH THE INFORMATION OF EXPLAINED VARIANCES

		Technology	Coerce	Mimetic	Organization
1	The hardware software, network platform and databases are in the process of accepting and using e-CRM	.615	.361		
2	The knowledge and competence of staff influences the development of e-CRM usage	.502	.345		
3	There is a compatibility of the platform for e-CRM with the existing IT infrastructure	-.969			
4	Compatibility of e-CRM with the existing business systems in a company is in the process of adopting and using e-CRM	-.927			
5	Compatibility of e-CRM with the existing business processes in a company is in the process of adopting and using e-CRM	-.949			
6	Compatibility of e-CRM with the IT platform which our customers use is in the process of adopting and using e-CRM	-.985			
7	Accepting and diffusing e-CRM depends on the expectations with regards to income increase	.782			
8	Accepting and using e-CRM depends on the expectations with regards to market participation increase	.701			
9	Accepting and using e-CRM depends on the expectations with regards to the increase in quality communication with cooperatives and clients	.571			

10	Accepting and using e-CRM depends on the expectations with regards to the increase of the quality of business processes	.737			
11	Accepting and using e-CRM depends on the expectations with regards to the increase of the speed of carrying out business processes	.793			
12	Accepting and using e-CRM depends on the expectations with regards to the decrease in the number of errors during the work	.638			
13	Accepting and using e-CRM depends on the expectations with regards to the increase in the quality of the customer support service				.402
14	Accepting and using e-CRM depends on the expectations with regards to the strengthening of the image of an innovative company				.435
15	Accepting and using e-CRM depends on the expectations with regards to the increase in the quality of decision-making, managing, and controlling				
16	The substitution of the capital is possible owing to e-CRM	.533			
17	The substitution of work is possible owing to e-CRM	.390			
18	Time saving is possible owing to e-CRM	.393			
19	Using e-CRM can enable the reduced need for mental work	.642			
20	Using e-CRM depends on the simplicity of the usage	.538	.318		
21	Adopting and using e-CRM will not result in backlash from employees	.497			
22	Accepting and using the system depends on managerial support with regards to investment into e-CRM				.347
23	Accepting and using the system depends on managerial moral support		.332		.390
24	Accepting and using the system depends on managerial awareness of the importance of e-CRM	.352			.369
25	Adopting and using e-CRM depends on the available company's own financial resources		.322		-.491
26	Accepting and diffusing e-CRM depends on the human resources' ability to consider the needs and ways of collecting information and knowledge concerning buyers	-.741			
27	Accepting and diffusing e-CRM depends on the human resources able to manipulate information and knowledge concerning buyers	-.457			-.322
28	Accepting and diffusing e-CRM depends on the expectations of our business partners		.976		
29	Accepting and diffusing e-CRM depends on the expectations of our buyers		.935		
30	Accepting and diffusing e-CRM depends on the expectations of our regulatory bodies		.886		
31	Accepting and diffusing e-CRM depends on the expectations of our parent corporations		.914		
32	Our competitors are doing business well owing to e-CRM			.858	
33	Owing to e-CRM, our competitors maintain the image of an innovative firm			.810	
34	Government programs encourage acceptance and diffusion of e-CRM			.649	
	Initial Eigenvalues	12.094	3.198	1.847	1.242

% of Variance	35.569	9.405	5.433	3.653
Rotation Sums of Squared Loadings[a]	11.483	6.989	3.217	3.066

Legend

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Note: We have presented only significant coefficients in pattern matrix (absolute value larger than .30)

Source: Authors

B. Segmenting the sample with Cluster analysis

The authors have performed a cluster analysis with the objective of finding groups of enterprises with similar characteristics. The authors have subsequently run a cluster analysis wherein the inputs were the four PCA factors obtained from the factor analysis.

The aim was to determine distinct, mutually exclusive, and exhaustive groups in the population associated with the different phases within the e-CRM in firms, and to decide whether or not these phases could be associated with the four identified PCA factors.

Authors used hierarchical cluster analysis with the Ward's aggregation method based on squared Euclidean distance and the nonhierarchical k-means method in order to reduce the observations of various enterprises into clusters of similar enterprises according to the assimilation of e-CRM. The assumptions for the application of cluster analysis were, in a general sense, satisfied. The answers obtained pertaining to the enterprises' representatives were of a high quality and they seemed to reflect the current situation. The fact that there was no missing data indicates that the answers were not contaminated by respondent fatigue or response styles. Correlations between factors were moderate and so authors did not have any issues with multicollinearity. In order to check for any outliers amongst chosen firms, the authors applied the cluster analysis method of the nearest neighbor and did not find any firm that would be out of the clusters in the solution. The authors used canonical discriminant analysis for the profiling of the clusters of enterprises on the factors.

As the number of clusters was not known, a hierarchical cluster analysis using the Ward method aggregation was applied on 1,307 cases. This method is recommended when the analysis is made with factors, and not using direct variables, as is the case in this study. Distance measures were estimated using the squared Euclidean distance. Using the classification history and the dendrogram, three clusters (see Figure 3) were noticed. The first cluster contained 126 firms (9.6% of all cases), the second had 850 firms (64.8% of all cases), and the third had 331 firms (25.2% of all cases). The authors proved the stability of their results when they obtained similar cluster categorization following the application of nonhierarchical k-means means methods.

Table III shows their means and standard deviations with respect to the factors.

TABLE III

MEANS (M) AND STANDARD DEVIATIONS (SD) WITH RESPECT TO THE FACTORS

	CLUSTER 1		CLUSTER 2		CLUSTER 3	
	M	SD	M	SD	M	SD
Technology	-1.47	0.64	0.69	0.30	-1.21	0.23
Coerce	-2.78	0.70	0.29	0.40	0.31	0.31
Mimetic	-1.26	1.42	0.20	0.82	-0.02	0.87
Organization	-0.30	1.77	0.26	0.79	-0.54	0.81

Source: Authors

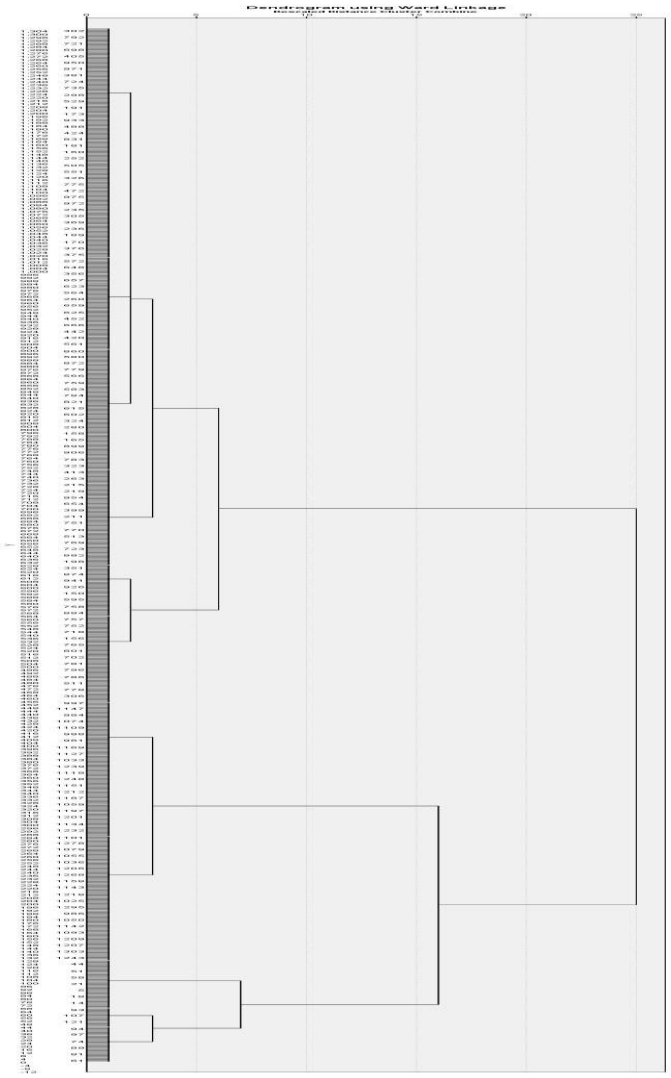

Fig. 3: Dendrogram for Hierarchical Cluster Analysis of Firms
Source: Authors

C. Profiling the cluster with Canonical discriminant analysis

In order to profile clusters and check the reliability of the clustering, the authors carried out a discriminant analysis by taking the four factor scores as independent variables for each of the cases, with dependent variables corresponding to their own cluster. Assumptions for this analysis are very flexible, especially when the authors had a large sample [94]. Box's M test indicated a heterogeneity in variance across the groups (Box's M=550.638, F(20, 324790.967)= 27.271, p<0.01). An Omnibus test of multivariate normality indicated that the data did not have a normal multivariate distribution. There were no significant multivariate outliers. There were no problems with multicollinearity.

Both canonical discriminant functions were significant. The first canonical discriminant function separated Cluster 1 from Cluster 2 (R_c=.951, Λ=9.368, Λ_w=.021, χ^2(df=8)=5041.272, p<0.01). The firms grouped in Cluster 1 were higher on the scales of Technology and Organization than firms gathered in Cluster 2. The second canonical discriminant function distinguished Cluster 1 from Cluster 3 (Rc=.885, Λ=3.626, Λ_w=.216, χ^2(df=3)= 1995.144, p<0.01). The firms grouped in Cluster 3 were lower on the Technology scale and higher on the Organization scale than firms gathered in Cluster 1. Discriminant functions correctly classified 99.5% of original cases into their clusters.

TABLE IV
STRUCTURE MATRIX WITH FUNCTIONS AT GROUP CENTROIDS

Structure Matrix	Function	
	1	2
Technology	.897*	-.440*
Coerce	.132	.120
Mimetic	.106	-.103
Organization	.521*	.774*
Functions at Group Centroids		
Cluster 1	-6,911	-3,927
Cluster 2	2,091	-.503
Cluster 3	-2,738	2,787

*Legend * Significant correlation with discriminant function*
Source: Authors

Figure 4 shows that the clusters are clearly divided in space determined by two interpreted discriminant functions. However, it seems that there are some members of Cluster 2 that are very similar to those in Cluster 3 in terms of the first discriminant function.

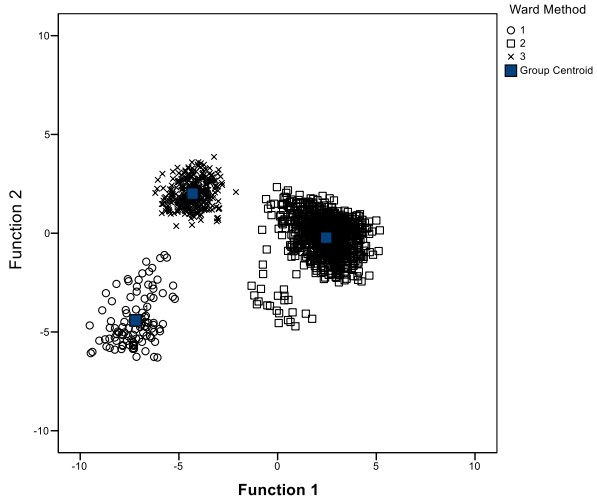

Fig. 4: Distribution of clusters' members in the space determined by discriminant functions with the position of group centroids
Source: Authors

D. Comparing the phase of life cycle and the cluster membership

Contingency coefficient showed, as expected, that the phase of life cycle is related to cluster categorization (C=.775, χ^2(df=4)= 1967.632, p<0.01). According to the contingency table, most of the members from the first cluster were in the routinization phase, all firms from the second cluster were in

the intention phase, and almost all firms from the third cluster were in the adoption phase (Table V).

TABLE V

CROSSTAB WITH COUNTS ACCORDING TO THE CLUSTER AND PHASE OF LIFE CYCLE

		Phase of life cycle			Total
		Intention	Adoption	Routinization	
Cluster	1	22	28	76	126
	2	850	0	0	850
	3	4	327	0	331
Total		876	355	76	1307

Source: Authors

Based on the obtained results, the authors conclude that the significance of factors identified as having the biggest influence is not the same with all companies, and that it differs depending on which phase of e-CRM assimilation the company is in. This is in accordance with the findings obtained for other types of IT innovations as well [6], [58].

The results also show that, within one e-CRM assimilation phase, there is no equivalent influence of the factors within the groups of technical, organizational, and environmental factors.

Specifically, the first discriminant function distinguished Cluster 1, in which members were mainly in the routinization phase, and Cluster 2, in which members were in the intention phase.

In companies in which the acceptance of e-CRM had begun and had been reviewed according to the groups of factors, the most significant influence was the group of organizational factors, then technical factors and, lastly, environmental factors (Appendix B). Out of the group of technical factors, the factor of technological readiness proved to have the most significant influence, followed by perceived cost, the factor of expected benefit, and the simplicity of using the system. Whereas the factor of IT integration was recognized as the least important in this phase of e-CRM assimilation. This means that, in the phase of initiating and adopting this technology, there are no equivalent influences on technical factors. In this way, hypothesis H1 is confirmed. These results match the results obtained in a number of studies [40], [42], [43], i.e. they confirm that the significance of this factor is bigger in the phase of initiating the system, and that its significance drops with each passing phase. In other words, the technique emphasized by Chong and Chan [43] - the initiation of adopting some technology - will be absent, while, logically, with each next developing phase of innovation distribution, it will give its place to IT integration [47]. This finding suggests that the company's management feels the need to appropriate ICT platforms and ICT expertise is crucial in this period of decision-making in terms of e-CRM adoption, and that the IT integration should deal with the issue in later phases. It is interesting to consider that the factor of perceived cost has equal significance in each e-CRM assimilation phase, which means that, like most other IT innovations, it is perceived as an expensive system. Because of this, only those companies which carry out permanent cost tracking and can compensate them with benefits of the implemented e-CRM system.

Unlike in previous studies [48], [54], [84] expected benefits have the same influence on the initiation phase and on the routinization phase. It is certain that the influence of the factor of expected benefits is the same in both phases, and this can be explained when we consider that the initiation of adopting the innovation is always subjected to a thorough analysis of the possibility of returning the investment, whereas the routine usage of the system is always subjected to a thorough analysis as to whether what was planned was realized. Furthermore, the findings showed that companies in the phase of initiating the system, unlike those in the advanced phases of technology diffusion, do not neglect the issue of system complexity when bringing about a decision. The findings obtained complied with previous results, which warn that complex systems deter decision makers from adopting and using innovations [99].

Not all organizational factors have the same influence on the phase of initiating the e-CRM adoption, meaning that hypothesis H2 is confirmed. The most significant influence on this group is financial resources, and this is followed by managerial support, as shown by the results of a few previous studies [48], [84]. On the other hand, the factor of customer knowledge management has the weakest influence. This finding seems logical because the competence of customer knowledge management can stand out only after the system starts to be used routinely.

Similar to previous studies [54], [58], this research shows that competitor pressure and customers' expectations can trigger companies to make decisions on e-CRM adoption. This is good from one point of view because it can make companies that are naturally inert step into the processes of adopting what they need. On the other hand, this finding suggests that management should be cautious, as observed by Zhu et al. [58] as these pressures can turn into a "chase" for newer technology, distracting the company from focusing on the real reasons they need it. The influence of mimetic factor opens up the dilemma of whether or not increased imitation of somebody in the processes of decision-making concerning adopting the system can mean that the company has issues in understanding the need for e-CRM, is not familiar with the technology itself, and maybe feels their objectives can be achieved by it.

The second canonical discriminant function showed that there are differences between Cluster 1 that gathered firms in the routinization phase and Cluster 3 that gathered firms in the adoption phase. Analysis showed that the significance of organizational factors is bigger in the system adoption phase than in the routine system usage phase. This result complied with the authors' expectations, and it confirmed the findings of previous studies [48] showing that organizational factors are important in all phases of IT assimilation, but that the measure of significance is bigger in the phases before the routine system usage phases.

There is evidently an unbalanced influence on the identified technical factors for the e-CRM adoption phase (hypothesis H4 is confirmed), where there is a focus on the factor of IT integration, which was already shown in previous studies to be linked to other IT innovations [48], [58]. This means that we should obtain more resources for e-CRM in each deeper assimilation phase in order to speed up the integration processes

of these systems with existing systems and processes. Furthermore, it is necessary to invest in maturing this technology at least up to the level of maturity of the existing ones, in order to work on adjusting the standard by removing all difficulties related to the issues of incompatibility and bad system integration with other systems. More specifically, if the e-CRM in the adoption phase cannot be integrated with existing solutions, activities, procedures etc., then there is a big risk of unsuccessful implementation.

Relying on the conclusions of previous studies [48], [54], [84] the authors expected less of an influence of the perceived cost for this phase. This study did not show this. Clearly, each further phase brings about bigger risks, anticipating new investments and new cost re-examinations. In other words, as suggested in Wang et al. [54], the adoption phase still does not anticipate maturity, which could result in carelessness related to costs and benefits.

Overall, organizational factors have a stronger influence at this stage than in the intention and routinization phases. If they are reviewed individually, factors within organizational contexts do not have the same influence in this phase of e-CRM assimilation, thus hypothesis H5 is not confirmed. The factor of managerial support was shown to be more significant than the factor of financial resources. Regardless of the fact that this phase of system development still requires significant financial investment, it seems that managerial support is more important. This finding can be justified by the increased need for managerial arrangements due to the requirements of re-engineering business processes, coordinating users, managing the changes, bringing new decisions regarding the system, etc., which has also been recognized in other studies [11], [54].

Hypothesis H6 is not confirmed. As a result of previous studies which do not recognize a significant influence in institutional factors in the more advanced phases of technological assimilation [48], [58], the authors expected that such a result would be obtained in this study. However, findings show that these factors have an influence even in the phases when e-CRM has already been accepted. The significant influence of the factor of Mimetic pressures was surprising. It is possible that the management teams of the observed companies are aware of the risks that the e-CRM implementation process entails, and that, in imitating behavior, they seek to avoid the problems that others have already faced.

The findings for the routinization phase showed that Hypothesis H7 was confirmed, whereas Hypotheses H8 and H9 were not. As in the adoption phase, in this phase the factor of IT integration had a bigger influence than all other technological factors. This finding complied with the expectations of the authors of this study and the findings of other studies [80]. As the need for technological readiness is anticipated in this phase, the benefits are already noticed and the system is being routinely used, meaning that there are no expectations with regards to the simplicity of the usage. Thus, there is still a significant amount of e-CRM integration with other parts of the business system during this phase. In this phase, unlike the previous two, in terms of the group of organizational factors, the factor of customer knowledge management is somewhat more significant. It seems logical to implement staff support during this phase as staff should have the ability to manage the customer knowledge and stress the need for managerial support. The authors expected that there would be no influence of institutional factors during this phase, however the findings show that they still exist and that the Coercive pressures factor is especially significant. In searching for possible reasons for such a finding, the authors determined that it would be reasonable to suppose that it this was a consequence when clients and other related companies needn't have only requirements for the technology to be accepted, but could have requirements that it should go towards more efficient routine usage, towards more efficient transactions, or towards routinization at the level of each department within a company.

E. Comparing the size of the firm and the cluster membership

The size of the firm is related to its cluster categorization ($C=.582$, $\chi 2(df=2)= 670.990$, $p<0.01$). According to the contingency table, most of the members of the first cluster were large firms and almost all firms from the second and third cluster were small and medium firms (Table VI). In other words, comparing cluster categorization with business size showed that almost all larger firms were in the routinization phase, while just 4.5% of small and medium sized firms had reached this phase. Most small and medium sized firms (68.66%) were in the intention phase and 26.80% of them were in the adoption phase. This finding correlates with Rogers's claim [100] that company size is probably a surrogate of a few company features and that adopting and using innovation depends on them. The most frequent are the following: Total resources, financial readiness, technical, and all other competences of the company's employees. This is why bigger companies come into the phase of routine usage of the system as a result of the resources that they already own.

TABLE VI

CROSSTAB WITH COUNTS ACCORDING TO THE CLUSTER AND THE SIZE OF FIRM

		Small and medium	**Large**	**Total**
Cluster	1	56	70	126
	2	848	2	850
	3	331	0	331
Total		1235	72	1307

Source: Authors

VI. CONCLUSION, IMPLICATIONS, LIMITATIONS, AND FUTURE RESEARCH

Although there have been numerous previous research efforts by the authors to comprehensively analyze the issues of adopting and using e-CRM, scholarly literature still lacks the findings regarding e-CRM assimilation and those which can identify the factors that play the most important role in certain phases of e-CRM assimilation. The most important factors which shape e-CRM assimilation, as well as IT innovations, are identified in this study.

Specifically, in using the cluster analysis, this study points out when or in which phase, factors should be given bigger

importance. Analysis has shown that the company will reach the phase of routine system usage more quickly if the initiation phase of system introduction gives priority to technical factors and, in the phase of system introduction, to organizational factors.

These findings can help us conclude that initiatives for e-CRM introduction can be absent if the companies do not possess appropriate technological readiness. This finding suggests that, if management does not direct the resources towards this type of technical competency, it risks the company retaining old systems, outdated technological versions, and developing the inclination towards the non-efficient "patching" of existing technology, finally losing the possibility of efficient customer management.

It has been shown that this phase, after the factor of technological readiness, is followed by perceived cost and expected benefits. This means that initiators of introducing this technology must invest additional efforts to make decision-makers aware of the costs of its development and its possibilities with regards to positive influences on business performance, efficient customer relations, and productivity in comparison to existing technologies in the company.

It is obvious that e-CRM is still experienced as a technology whose usage needs to be conquered according to its volume and complexity. Various e-CRM platforms should be presented to the decision-makers of e-CRM introduction, encouraging others by demonstrating their success, i.e., provided selection of one which can enable simple access and work on the system.

Although competitor pressure and customer expectations can trigger companies to make the decision to adopt e-CRM, these findings suggest that the management of a company must differentiate themselves from external influences in order to avoid the consequences of blind following by copying the behaviour of other companies. This caution can provide real estimates related to the needs for e-CRM, as well as a better focus on the problems of e-CRM implementation.

Our findings also show that sufficient financial and moral support is needed in order to allow a company to move on quickly to each subsequent phase of e-CRM assimilation. In other words, in the process of progressing towards the routine use of the system, apart from the need to provide sufficient financial resources, the need to adapt the new system to existing information systems, to redesign the business structure, adapt it to existing new technology, etc., should not be forgotten. This is especially important for companies that are stoic when there is a need for technical and organizational adjustment.

The study also shows that company size is an important determinant of the e-CRM assimilation pace, i.e. the largest number of SMEs are in the phase of e-CRM initiation and adoption, and the largest number of large companies are in the phase of routine system usage. This means that the managers of SMEs must put additional measures in place to ensure that their business systems become more flexible in decision-making with regards to the allocation of identified resources from one phase to another. These findings also suggest that they should additionally remedy the incompatibility issues of inherited systems.

This study offers a range of practical and theoretical implications. Thanks to these results, in practice, the obstacles that slow down or interrupt efficiency in e-CRM assimilation processes can be removed. In other words, owing to our results, it is possible for companies to adjust their efforts and obtain a better allocation of disposable resources, depending on which phase of e-CRM assimilation the company is currently going through.

In addition to this, keeping in mind that e-CRM is not the only IT support used in business, these findings can contribute to the acceleration of the assimilation process and other business IT systems as well.

More specifically, the obtained results can serve as inputs during the decision-making process when introducing the e-CRM; when deciding on whether or not to invest in an IT infrastructure or IT integration; when deciding on the allocation of staff and financial resources, etc. Decision-makers have to be aware that a technical infrastructure and employees with the necessary technical knowledge and skills are very important when it comes to introducing the system, and that the IT integration will be more significant only in the subsequent phases. The result showing that the simplicity of the system is identified as an important factor only while making a decision on technological adoption, which managers can use. They can solve the issue of a lack of knowledge and skills in further decisions even before the introduction of the system itself, or/and in order to review and change standard organizational procedures in the phase of accepting the system.

Results obtained in this way can help managers to recognize those factors that, in the given moment, have the greatest influence on a large number of factors that influence the diffusion of the IT innovation. In other words, by being familiar with various measures of influence, managers can avoid exhausting efforts to deal with the available resources in the same way. Undoubtedly, these analyses can help company managers to identify the reasons behind the failures of their projects concerning e-CRM development. In addition to this, those who make decisions to introduce technologies, as well as those who take part in the development of these technologies, must not forget that larger organizations reach the level of routinization with less difficulty. In SME, they should pay attention to the factors identified in this study and to try to ensure the efficiency of the process of e-CRM assimilation by removing the obstacles in the way of their routine.

From a theoretical point of view, this study contributed to discussions on the topic of e-CRM diffusion, i.e. e-CRM assimilation, as previous efforts have mainly focused on e-CRM adoption and, as such, have only studied isolated phases and offered insufficient information to help someone to understand the process from adoption to the routine usage of a system.

This work emphasizes the significance of the problem "differently directed effects" of the e-CRM life cycle, which, according to the authors' knowledge has not been researched so far.

Furthermore, this study supported the approach of a theoretical framework integration, and it offered integrated TOE, DOI, and INT frameworks and the systematization of factors for future researchers examining ICT diffusion. In this way, there is a smaller literary gap in the context of the existence of a larger number of studies from the field of IT innovations, and which do not have a holistic approach to the integration of theoretical frameworks.

This analysis goes beyond the national framework; it can be regarded as an analysis in a multi-country context, which allows the theory to contribute to the topic of ICT diffusion at an international level. The authors also believe that the research model has been designed in such way that it can be applied to other studies in which the diffusion of IT innovations is being studied. However, the authors recognize some limitations in this study which can serve as a basis for recommendations for future researchers.

Firstly, the authors do not differentiate between developed and undeveloped countries in this research, and this could be useful for researchers to investigate in terms of its link to IT innovations and issues concerning softening a digital gap.

Secondly, the authors chose to integrate three theoretical frameworks, and it would be interesting to see what results could be obtained by using other theoretical frameworks to test the determinants of e-CRM diffusion. This could be explored by future researchers. The choice of theoretical frameworks resulted in a choice of organizational, technical, and environmental factors. There are no stable or unique lists of these factors in scholarly literature upon which it is possible to conduct this analysis, and so it is possible that a different composition could bring about different results. The authors are aware that there are other factors which can shape IT assimilation as well but, due to the need to create a universally accepted questionnaire to be used to investigate the problem of e-CRM as a specific IT innovation, they have not been investigated in this research.

However, there is a need for the further refinement of the questionnaire. The authors used factor analysis for the variable reduction in order to avoid the multicollinearity problem that typically occurs when questionnaires with parallel items are used. However, correlations between factors were moderate and this problem was not completely avoided. This could lead to a weighting process in which authors cannot identify issues based on seeing the results of the process. As the factors are correlated, it could be useful to work on forming a questionnaire in which a subscale is not correlated, decreasing collinearity between variables. There is a possibility that the authors obtained a poor representation of the actual structure as a result of the use of factor analysis. We recommend a reduction in the number of items in order to avoid factor analysis and maintain the results of those with the strongest discriminative power. In addition to this, this study could be expanded by analyzing the influence of technical, organizational, and environmental factors in different assimilation phases across various industries. In that way, we could observe a difference between informatively intensive and informatively non-intensive industries.

Lastly, due to the lack of evidence from the previous period, this research is based on the data of a cross-section of one particular time era. This means that an analysis based on the data from more consecutive periods could reveal whether or not there are any deviations from the obtained results. Furthermore, the longitudinal analysis of the factors could contribute to a better understanding of e-CRM system evolution.

APPENDIX

Appendix A: Survey Questions

Variables	*Items*
Technology readiness	1. In our company, the hardware, software, network platform, and databases are in the process of accepting and using e-CRM 2. Knowledge and competence of the staff influence the development of e-CRM usage
IT integration	1. In our company, there is a compatibility of the platform for e-CRM with the existing IT infrastructure 2. Compatibility of e-CRM with the existing business systems in a company is in the process of adopting and using e-CRM 3. Compatibility of e-CRM with the existing business processes in a company is in the process of adopting and using e-CRM 4. In our company, compatibility of e-CRM with the IT platform which our customers use is in the process of adopting and using e-CRM
Expected benefits	1. Accepting and diffusing e-CRM depends on the expectations with regards to income increase 2. Accepting and using e-CRM depends on the expectations with regards to market participation increases 3. Accepting and using e-CRM depends on the expectations with regards to the increase in quality of communication with cooperatives and clients 4. Accepting and using e-CRM depends on the expectations with regards to the increase of the quality of business processes 5. Accepting and using e-CRM depends on the expectations with regards to the increase of the speed of carrying out business processes 6. Accepting and using e-CRM depends on the expectations with regards to the decrease of the number of errors made during the work 7. Accepting and using e-CRM depends on the expectations with regards to the increase of the quality of the customer support service 8. Accepting and using e-CRM depends on the expectations with regards to the strengthening of the image of an innovative company 9. Accepting and using e-CRM depends on the expectations with regards to the increase in the quality of decision-making, managing, and controlling
Perceived cost	1. Compatibility of e-CRM with the IT platform which our customers use is in the process of adopting and using e-CRM
Simplicity	1. The substitution of the capital is possible as a result of e-CRM 2. The substitution of work is possible as a result of e-CRM 3. Time saving is possible as a result of e-CRM
Management support	1. Accepting and using the system depends on managerial support with regards to investing into e-CRM 2. Accepting and using the system depends on managerial moral support 3. Accepting and using the system depends on managerial awareness of the importance of e-CRM
Financial resources	1. Adopting and using e-CRM depends on the available company's own financial resources
Customer Knowledge management	1. Accepting and diffusing e-CRM depend on the human resources able to consider the needs and ways of collecting information and knowledge concerning buyers 2. Accepting and diffusing e-CRM depends on the human resources able to manipulate information and knowledge concerning buyers
Coercive pressures	1. Accepting and diffusing e-CRM depends on the expectations of our business partners 2. Accepting and diffusing e-CRM depends on the expectations of our buyers 3. Accepting and diffusing e-CRM depends on the expectations of our regulatory bodies 4. Accepting and diffusing e-CRM depends on the expectations of our parent corporations

Mimetic pressures	1. Our competitors are doing business well owing to e-CRM 2. Owing to e-CRM, our competitors have retained the image of an innovative firm
Normative pressures	1. Government programs encourage acceptance and diffusion of e-CRM
Our organization has employees	Please insert number of employees

Our organization has been in e-CRM phase	Initiation to adopt e-CRM e-CRM adopt e-CRM routinization

Appendix B: Averages and ranges for related groups of items for phases of life cycle

Variables	Phases of life cycle	Intention		Adoption		Routinization	
		M	range	M	range	M	range
Technical	Technology readiness	6.32	1	5.21	3	3.61	4
	Simplicity	3.34	4	6.25	5	5.71	5
	Perceived cost	5.88	2	5.03	2	4.79	2
	Expected benefits	6.32	3	5.83	4	5.40	3
	IT integration	5.22	5	4.01	1	3.00	1
	Technical (average)	5.42		5.26		4.50	
Organizational	Management support	6.42	2	5.96	1	5.35	3
	Financial resources	6.56	1	6.58	2	6.35	1
	Customer Knowledge management	3.91	3	5.52	3	6.20	2
	Organizational (average)	5.63		6.02		5.97	
Environment	Coercive pressures	6.24	1	6.22	1	2.55	1
	Mimetic pressures	2.15	2	2.05	2	1.96	2
	Normative pressures	2.00	3	1.93	3	1.86	3
	Environment (average)	3.46		3.41		2.12	

Appendix C: Sample selection

		Count	Column N %
life cycle phase e-CRM	Intention	876	66.8%
	Adoption	356	27.2%
	Routinization	79	6.0%
Firm size	Small and middle	1239	94.5%
	Large	72	5.5%

Sample selection

		Firm size			
		Small and middle		Large	
		Count	Column N %	Count	Column N %
Phases of the e-CRM life cycle	Intention	852	68.8%	24	33.3%
	Adoption	328	26.5%	28	38.9%
	Routinization	59	4.8%	20	27.8%

Cronbach's Alpha Reliability				
Cronbach's Alpha	N of Items	Cronbach's Alpha Based on Standardized Items	Cronbach's Alpha for individual subscales	
.647	34	.776	Technology	.61
			Coerce	.94
			Mimetic	.68
			Organization	.77

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