METHODOLOGY AND COMPUTER ARCHITECTURE FOR SUSTAINABLE CUSTOMER RELATIONSHIP MANAGEMENT

Metodologia e arquitetura computacional para Gestão Sustentável do Relacionamento com o Cliente

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ABSTRACT

Sustainable Customer Relationship Management (SCRM) tries to align company strategy, business processes, and company information technologies to carry out a sustainable customer relationship management. However, despite the growing interest of companies in incorporating social and environmental aspects into their relationship with customers, and the increase in the number of sustainability-conscious customers seeking more sustainable lifestyles, research on SCRM is recent and limited. This work contributes to the development of SCRM as it proposes a methodology and a computer architecture that guide the implementation of SCRM in a company during the whole project life-cycle. The methodology includes all the dimensions of sustainability in customer relationship management, and allows to align business strategy, business process, human resources. The computer architecture combines different information technologies and systems such as Business Intelligence, Big Data, or Online social networks.
Keywords: Big Data, Business Intelligence, Social networks analysis, Business Process Re-engineering, Sustainable Development, Marketing

METODOLOGIA E ARQUITETURA COMPUTACIONAL PARA GESTÃO SUSTENTÁVEL DO RELACIONAMENTO COM O CLIENTE
Methodology and computer architecture for Sustainable Customer Relationship Management

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RESUMO

O Gerenciamento Sustentável de Relacionamento com o Cliente (SCRM) tenta alinhar a estratégia da empresa, os processos de negócios e as tecnologias de informação da empresa para realizar um gerenciamento sustentável do relacionamento com o cliente. No entanto, apesar do crescente interesse das empresas em incorporar aspectos sociais e ambientais em seu relacionamento com os clientes, e do aumento do número de clientes preocupados com a sustentabilidade que buscam estilos de vida mais sustentáveis, as pesquisas sobre SCRM são recentes e limitadas. Este trabalho contribui para o desenvolvimento do SCRM, pois propõe uma metodologia e uma arquitetura computacional que orientam a implementação do SCRM em uma empresa durante todo o ciclo de vida do projeto. A metodologia inclui todas as dimensões da sustentabilidade na gestão do relacionamento com o cliente e permite alinhar a estratégia de negócios, o processo de negócios, os recursos humanos. A arquitetura do computador combina diferentes tecnologias e sistemas de informação, como Business Intelligence, Big Data ou redes sociais online.
Palavras-chave: Big Data, Inteligência de Negócios, Análise de redes sociais, Reengenharia de processos de negócios, Desenvolvimento Sustentável, Marketing

INTRODUCTION

At the end of the 1990s, the increase in competition and digitalization generated a new form of business management, called Customer Relationship Management (CRM), where the customer was placed at the centre of corporate strategy (Chen et al., 2021; Guerola et al., 2021). CRM involves a combination of practices, technology and people aimed at providing a better understanding of customers' needs, personalizing its products and services, improving customer satisfaction, sustaining customer loyalty and, thus, differentiating firms from their competitors (Meena & Sahu, 2021).

Companies' awareness of the importance of economic, environmental and social sustainability and, on the other hand, the rise in the number of highly responsible consumers who, aware of the negative impacts of production and consumption, seek more sustainable way of life (Andervazh & Ghorbanpour, 2024; Lee et al., 2020) have driven CRM to evolve towards what is known as sustainable CRM (SCRM) (Hitka et al., 2019). SCRM means considering economic, environmental and social issues when establishing and maintaining long-term customer relations, as well as to increase consumer information about corporate sustainability issues and to attract and retain sustainability-conscious customers (Müller, 2014; Stekelorum & Laguir, 2021).

However, research on SCRM is scarce, and practitioners have difficulties incorporating sustainability into CRM (Gil-Gomez et al., 2020). SCRM research commonly considers one sustainability dimension (social, economic, or environmental), without an integrated perspective (Jang & Lee, 2021). Therefore, SCRM is depicted as a fragmentated idea instead of considering a holistic view. Moreover, SCRM usually consider only marketing (Ližbetinová et al., 2019), disregarding other business process such as post-sales or sales.

Therefore, there are different gaps in the research on sustainable CRM that must be covered (Liu & Chen, 2021): (1) it is necessary to develop studies that explore the link between CRM and business sustainability, covering all its dimensions: economic, social and environmental (Bahri-Ammari & Soliman, 2016); (2) it is necessary to develop methodologies and theoretical models that help in the implementation of SCRM as a basis for future empirical analyses (Hasani et al., 2017); (3) it is necessary to identify customer-oriented sustainability metrics based on customer metrics (Das & Hassan, 2021; Müller, 2014), and (4) there is a need for cases of good practices that contemplate different industries and contexts (for example emerging/ developed countries) in order to facilitate the understanding of SCRM (Danubianu & Teodorescu, 2016; Pohludka & Štverková, 2019).

To overcome the above research gaps, this paper proposes a step-by-step methodology, called Sustainable CRM-IRIS, to lead the entire life-cycle project of integrating the different perspectives of sustainability (environmental, social, and economic) into the different aspects of CRM (strategy, business process and technology). The Sustainable CRM-IRIS methodology is composed of nine phases, each of which contains different activities.

This paper is organized as follows: Section 2 presents a review of the literature related to SCRM. Section 3 outlines the Sustainable CRM methodology proposed here for the implementation of a Sustainable Customer Relationship Management. Finally, conclusions and the limitations are discussed in Section 4.

1 LITERATURE REVIEW

1.1 Customer Relationship Management

Customer Relationship Management (CRM) is a concept that emerged in the 1990s, establishing itself as a research field in the early 2000s. CRM is the consequence of a change in business strategies. Previously, company strategies focused on convince customers to buy a service or product. However, with CRM, the business strategy changed radically and began to focus on customers and their needs. This change, supported by new both information technologies and forms of organization (Cierna & Sujova, 2022) resulted in a customer-focused business strategy that transforms relationships between companies and clients (Liu & Chen, 2022).

Although there is no one CRM definition or approach in the literature, -it has been studied from different research areas (Computer Science, Business, Marketing, or Management) and points of view (Strategy, Technological, Process, Philosophy)- (Li & Xu, 2022), many researchers agree that CRM should consider

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forecasting, sales, marketing, and after-sales support business processes (Sun & Wang, 2022) with the aim of generating enduring value between customers and the company.

This new way of managing customer relationships, together with the support offered by information technologies, allows companies to (1) have a single, integrated view of customers, (2) manage customer relationships in a personalized way, and (3) improve the customer-related business processes performance (Greenberg, 2001). Therefore, CRM provides both the company and customers with multiple benefits such as improving customer trust, satisfaction, service, segmentation, and personalized service (Utz et al., 2023; Oluwajana et al., 2021).

1.2 Sustainability

The concepts of sustainability and sustainable development emerged in the last decades of the 20th century due to the need for a development model that would be economically, socially and environmentally viable over time. The best-known definition is the one presented in the Brundtland Report in 1987, which says that sustainable development is that which "satisfies the needs of the present without compromising the needs of future generations".

Society's awareness about sustainable development has changed the way business is understood and has boosted new management models that consider the dimensions of sustainability (economic, environmental and social) into decision-making. The objective is the creation of real long-term shared value between companies and their stakeholders (Tourais & Videira, 2023), by implementing changes in companies to reduce their environmental impact and improve the social aspects (Dhar et al., 2020). Therefore, corporate sustainability is not only a useful marketing tool to improve the image and reputation of the company, but also a strategic vision where the creation of shared value (customer value, economic value, environmental value, and social value) and sustainability policies must be placed at the centre of the organization and the business strategy in such a way as to shape a long-term holistic and integrated approach (Lawrence & Mekoth, 2023).

To manage sustainability in companies, it is necessary to develop a performance measurement system composed by different sustainability indicators (Guo & Wu, 2022). This system measures the progress and success of sustainable actions and policies, allowing managers to take the appropriate corrective actions to achieve the intended strategic goals, as well as to develop reports in order to communicate company's sustainability to stakeholders, and foster their engagement. However, recent literature on sustainability indicators do not equally consider all three dimensions (economy, environment, and society) of sustainability (Hollauer, 2017) although all three sustainability dimensions should be include in a comprehensive way (Masdar, 2017). While economic performance, such as profitability or sales growth, is thoroughly studied, non-financial performance is treated as a wider concept (Asiaei et al., 2021), and consumer's perspective is rarely considered (White et al., 2019).

1.3 Sustainable CRM

Sustainable Customer Relationship Management (SCRM) is a recent concept that has its origins in traditional CRM and is developed contemporaneously with global trends in digitalization and sustainability (Bhat & Darzi, 2018; Vesal et al., 2021). SCRM is due to the increase of (1) companies' awareness about sustainability (Ceccarini et al., 2022); and (2) the number of highly responsible consumers (Papadopoulo et al., 2022; Narayanan, 2022). SCRM implementation is facilitated by information technologies that allow to make the CRM business processes more sustainable (Bazrkar et al., 2023; Rahman et al., 2023; Ding et al., 2022).

Currently, research regarding sustainable CRM is recent and limited (Ahuja et al., 2019). Furthermore, it does not usually adopt a comprehensive perspective, covering only one of the dimensions of sustainability (Müller, 2014; Petru et al., 2019). In addition, SCRM is commonly treated from sustainable marketing, where "sustainable" is linked to the durability of business activity with long-term customers (Bandyopadhyay & Ray, 2022).

Although these aspects are necessary for business sustainability, SCRM is presented as a fragmented idea that lacks a holistic view. As a consequence, it is necessary to develop methodologies that help organizations to implement an SCRM considering all the dimensions of sustainability and the different points of view of CRM (strategy, processes and technology) (Gil-Gomez et al., 2020; Shukla & Pattnaik, 2019).

2 METHODOLOGY FOR SUSTAINABLE CUSTOMER RELATIONSHIP MANAGEMENT

One of the main weaknesses hampering the achievement of the integration of sustainability into CRM systems is the need for a methodology that helps companies and organizations in the process of managing costumer relationships in a sustainable way. To cover this gap in the research, in this paper the Sustainable CRM-IRIS methodology is described. The methodology is based on the literature review, as well as on the experience of the authors. The CRM-IRIS methodology has been developed for companies manufacturing final products. The methodology has eight phases and helps throughout all the project life-cycle of developing and implementing a sustainable CRM (Figure 1).

Figure 1 - Sustainable CRM-IRIS methodology
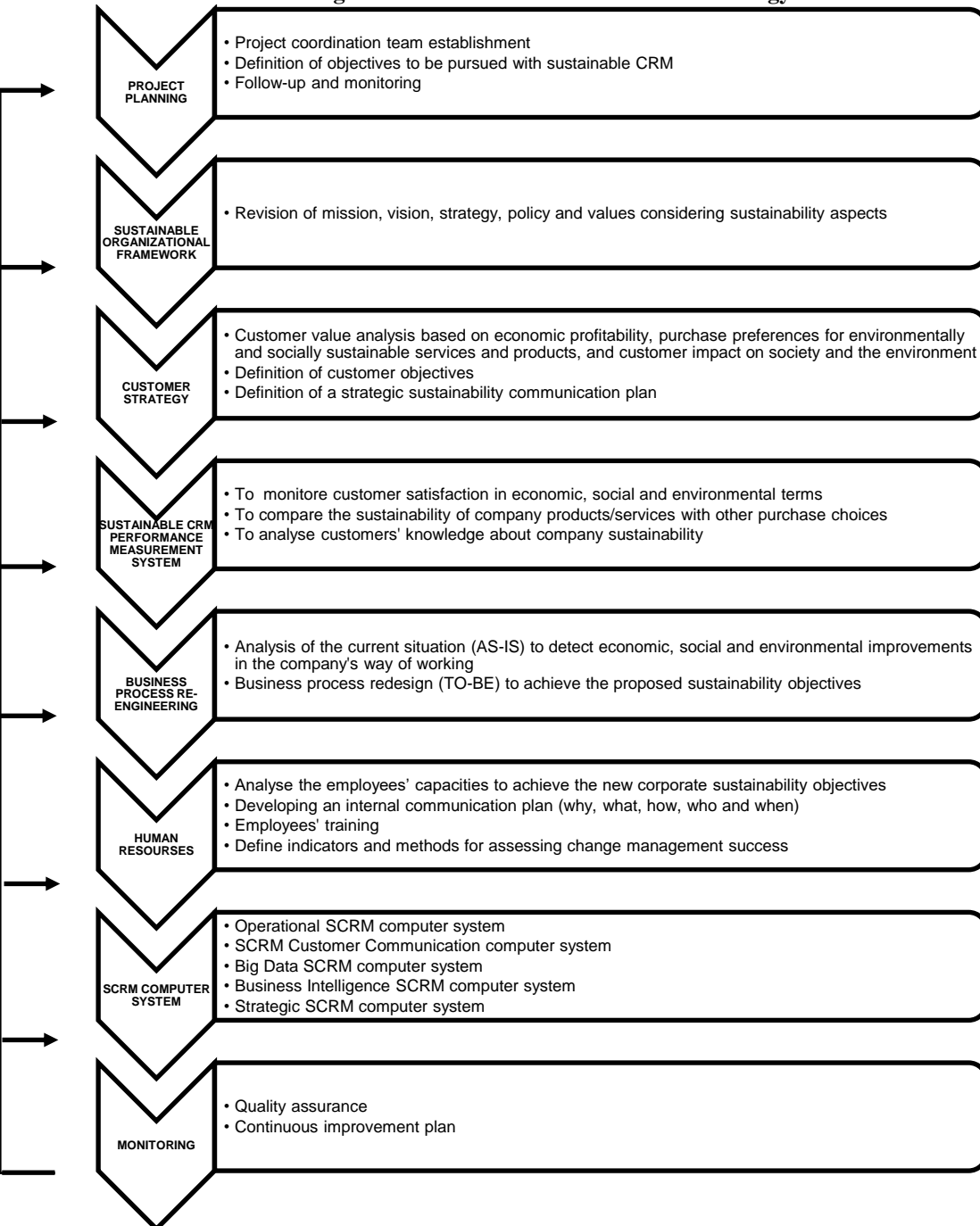
Each of the phases of the methodology are described below.

Project planning

The implementation of the SCRM must be managed as an engineering project. Within this phase, the following activities must be carried out:

- *Establishment of the project coordination team* (must include representatives from the information technology and sustainability departments). Within the team, a coordinator or person in charge of the project must be appointed.
- *Definition of the objectives of the implementation of sustainable CRM*. The company must ask itself how the sustainable CRM will benefit and enhance the acquisition of business objectives and, based on this, it must establish the objectives to be pursued with the SCRM implementation.
- *Follow-up and monitoring*. This follow-up should consider aspects such as time deviations, staff motivation, change resistance, the degree of participation and evaluation of the results to see if the planned objectives have been achieved. To do this, a system of indicators must be defined to measure success in the different phases of development and implementation of the project.

2.1 Sustainable Organizational Framework

The company' mission, vision, objectives, values, strategy and policy have to be reviewed. The following Sustainable CRM key aspects need to be considered: (1) corporate strategy has to consider the sustainable customers' needs; (2) the relationship between the enterprise and its sustainability-oriented customers has to be focused on engagement and commitment, not just on management or sales; (3) all enterprise departments should manage customers' relationships, because sustainability affects all business processes and departments; and (4) the sustainability-conscious customer expects transparency and corporate social responsibility from the company.

2.2 Customer strategy

Until now, CRM systems have been implemented in companies to achieve economic objectives by creating value for their customers (Azad & Ahmadi, 2015). However, in a sustainable CRM, the company must also seek to achieve social and environmental objectives when managing customer relationships. For this reason, the definition of the customer's strategy must include (1) economic, social and environmental objectives, and (2) the establishment of the necessary communication flows to inform and make customers aware of the company's sustainability. This phase consists of three activities.

- **Customer value analysis.** One of the main reasons of CRM systems failure is to establish relationships with improper customers (Garai & Roy, 2020). Therefore, it is necessary to analyse the value that a customer represents for the company and to focus actions only on customers that really add value. In traditional CRM, a valuable customer is one that can generate greater profitability or economic benefit for the company. In sustainable CRM, a valuable customer is one that (a) is economically profitable, (b) has a preference for purchasing environmentally and socially sustainable services and products purchasing environmentally and socially sustainable services and products, and (c) carries out activities with a positive impact on society and the environment.

To perform customer analysis, it is very useful to segment them. To do so, a multivariable matrix is proposed, which analyses customers according to four variables:
  - Variable 1: Customer environmental and social impact, coded as positive, neutral, negative or unknown. To calculate it, two main sources will be used: the customers' sustainability report and their stakeholders' opinions on the internet.
  - Variable 2: Customer profitability, coded as high, medium or low. To calculate it, a cost/benefit model will be used.
  - Variable 3: Socially sustainable purchasing preferences.

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    − Variable 4: Environmentally sustainable purchasing preferences. These last two variables are calculated from the history of purchases or customer demands and will be coded as high, medium or low.

Therefore, a multivariable matrix is obtained that shows the value of the company's customers. Figure 2 shows an example for six clients of the company. In the "High-high value" cell, there is a customer with high preferences for environmental and social sustainable purchasing but whose social and environmental impact is negative (in red) and the profitability that it brings to the company is low (small circle size). On the other hand, in the "Medium-medium value" cell, there is a highly profitable customer in economic terms (large size of the circle), with medium-level social and environmental purchasing preferences, and with a positive social and environmental impact (in green).

Figure 2 - Multivariate customer value analysis matrix
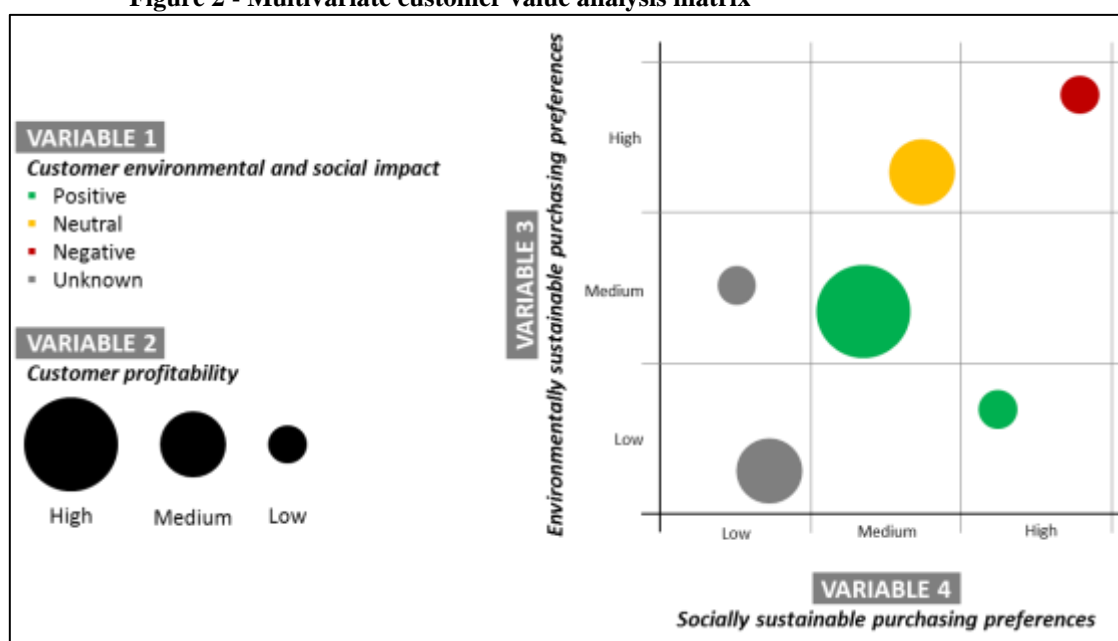
- **Definition of customer objectives.** The multivariable matrix in Figure 2 allows SCRM managers to establish differentiated objectives by groups of clients or individual customers. Instead of traditional CRM that focuses on sales or customer loyalty objectives, SCRM customer objectives are focused on moving customers in the matrix with the final objective of moving all customers to variable 1 positive and variables 2, 3 and 4 high. Short, medium and long term customer objectives are stablished by SCRM managers according to customers' requirements and characteristics, and company context analysis. The analysis of the evolution of the clients in the matrix allows to verify if the decisions made have had the expected results.

- **Definition of a strategic sustainability communication plan.** The objective of this plan is to inform customers and raise awareness about different aspects of corporate sustainability. This plan must be based on the customer value analysis previously carried out and should include specific actions for each customer segment or individual customer. For example, suppose that a company that implements Sustainable CRM has the objective of reducing the carbon footprint of the company. Customers with high environmental sustainable purchasing preferences, and medium or high economic profitability, would receive a *communication campaign*. However, highly economically profitable customers with low or medium purchasing preferences would receive an *awareness campaign* to increase their interest in products with a reduced carbon footprint. In this way, the loyalty of both groups of clients could be achieved through a corporate objective of environmental sustainability, the reduction of the company's carbon footprint and, consequently, long-term economic benefit.

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Different communication channels such as face-to-face or online meetings, web information, mailing, online social networks, etc. can be used. Among these tools, online social networks play an important role in SCRM. They allow (1) simple immediate and simple collaboration and interaction with customers; and (2) the alignment between customers' needs and company sustainability strategy and actions. But, they have to be used to know better customers' demands, and not just to advertise for creating a positive image of the company.

2.3 Sustainable CRM performance measurement system

To determine the degree of achievement of the objectives, it is necessary to develop a performance measurement system. However, the specific characteristics of Sustainable CRM compared to traditional CRM require the definition of new indicators related to sustainability. Therefore, new indicators are needed:

- To monitor customer satisfaction with the company's products and services in economic, social and environmental terms. These indicators will make it possible to evaluate the degree of effectiveness of the customers' strategy. Examples of these indicators are the number of complaints or positive opinions from customers in each of the three aspects of the company's sustainability.
- To compare the degree of sustainability of the company's products or services regarding other purchase choices of other companies. These indicators will be used within the strategic sustainability communication plan to help customers to make more informed and responsible purchasing decisions. Examples of these indicators are: the amortization period of the company's products through a cost/benefit study, or long-term savings due to the greater durability of the company's products compared to competitors (economic dimension); the amount of material, water, energy, or CO_2 emissions generated in the manufacture of the company's products or services compared to those offered by other companies (environmental dimension); or indicators related to the equity and safety of the company's workers, such as the salary difference between workers, or the percentage of men and women who work in the company (social dimension).
- To analyse the degree of customer awareness about the company's sustainability. This set of indicators will be useful to assess the effectiveness of the strategic sustainability communication plan. In addition, it will allow the company to detect whether the level of customer satisfaction is correlated with the extent of its knowledge about different aspects of the company's sustainability. Useful indicators could be the number of customers who are aware of the company's environmental risk management plan, the company's policy about reused and recycled materials, the number of web interactions in the Corporate Sustainability section, or the number of customers who make responsible purchasing decisions thanks to the information available about the products, services or company sustainability.

2.4 Business Process Re-engineering

The objective of this phase is to redesign the business processes to achieve the objectives defined in phase 3. This will require:

a)   *Analysis of the current situation (AS-IS)*. This analysis will make it possible to detect economic, social and environmental improvements in the company's way of working that promote the achievement of the sustainability objectives established with clients. Ideally in this type of analysis there should be a reference model with the best work practices, which facilitates benchmarking. However, the novelty of sustainable CRM hinders the availability of these models, which opens up a future line of research in the field of SCRM.

b)   *Business process redesign (TO-BE)*. After detecting the improvements needed to achieve the proposed sustainability objectives, the business processes must be redesigned. In a traditional CRM system, the main business processes to be redesigned are marketing, sales and after-sales. However, the holistic vision of

sustainable CRM opens up the need to redesign all the processes involved in the life-cycle of products or services. These processes, therefore, could encompass research, design, manufacturing, communication, etc. (Kakhki & Nemati, 2022). Table 1 shows an example of the changes that would be made in five company processes in the event that an objective of the customer strategy was to increase the customers' interest in products with a reduced carbon footprint, distinguishing between traditional CRM and sustainable CRM.

Table 1 - Example of differences between traditional and sustainable CRM

Business Process	Traditional CRM	Sustainable CRM
Marketing	Marketing campaigns aimed at increasing the economic profitability of the company	Marketing campaign aimed at environmental objectives
Sale	Invoices are issued with the economic amount	Invoices are issued with the economic amount and the carbon footprint of the product or service
Post-sales	There are no actions	Customer satisfaction surveys are carried out about the reduction in the company's carbon footprint
Manufacturing	There are no actions	Relevant aspects for the customer are considered, such as savings in raw materials, CO2 emissions or the use of artisanal techniques that allow traditions to be valued
Design	There are no actions	Consider the opinion and expectations of clients during the design process, for example, through interviews and surveys

2.5 Human Resources

The people who make up the company are in charge of carrying out any process or activity that happens in it. Therefore, they must know the importance of this new customer-focused strategy that encompasses economic, social and environmental aspects. It is necessary not only to obtain their commitment and ensure that they know what their new role is and the objectives to be fulfilled but also to ensure that they have the necessary skills to carry out the new business processes. The individual goals set for each employee must be aligned with the goals set for each customer and customer segment, and with corporate sustainability goals. In this phase, the Project Coordination Team together with the Human Resources Department should:

a) Analyse the employees' capacities to identify training needs or the necessity of recruiting new staff to achieve the new corporate sustainability objectives

b) Draw up an internal communication plan that helps to promote a change in the corporate culture and achieves the commitment of managers and employees. The plan must consider the why (what objectives are pursued), what (what information and messages are used), how (what language, media and communication channels are used), who (who is responsible for implementing it and to whom is it addressed) and when (when and how often).

c) Lead the training of employees so that they recognize their role and responsibility in achieving the customer strategy and carry out the improvements proposed in phase 3.5 properly, for each of the business processes.

d) Define indicators and methods for assessing change management success, e.g. percentage of employees who have completed the training courses or conducting surveys to identify the degree of employees' awareness of corporate and customer sustainability objectives.

2.6 SCRM Computer System

Computer systems play an important role in the development and implementation of SCRM. The proposed computer system architecture to support SCRM is made up of five components (Figure 3):

- *Operational SCRM computer system*: It will support the execution of the company's business processes, once redesigned to achieve sustainability objectives. The Operational SCRM computer system will be a combination of Enterprise Resource Planning (ERP) and other more specific software that the company has, since the SCRM affects not only the traditional CRM processes (marketing, sales and post-sale), but also others such as design, research & innovation, manufacturing, etc.
- *SCRM Customer Communication computer system*: It will allow the implementation of the strategic sustainability communication plan for customers proposed in section 3.3., supporting a immediate and simple bidirectional interaction between the company and its customers. Therefore, the different needs of real and potential customers will be recognized, fostering the generation of new knowledge and collective intelligence. Two tools should be used for this: the company website and the company's online social networks. These tools were chosen because: they disseminate information more effectively and quickly than the old media; their content is developed by the customers and the company; they allow for a quick answer about inquiries about the company sustainability issues; they allow real-time, persistent, and visible feedback with the customers, which allows better alignment between real and potential customers needs and the company's strategy; and in the case of crisis management, they offer the capacity to minimize the consequences.
- *Big Data SCRM computer system*: Big Data tools allow (1) to obtain a complete view of the customer, discovering relevant information of the customer through structured and unstructured data analysis from any channel and format; (2) to generate forecasting models of non-payment, abandonment, purchase, etc. trends; (3) to identify possible *sustainability-conscious* customers; and (4) to make commercial recommendations suggesting the best product or service for each real and potential customer (Orenga & Chalmeta, 2016). Different techniques can be used: query and hyperlink to Inquire; agents, profiles etc. to Interact; automatic query guidance, term analysis, parametric search, etc. to Investigate; and classification by feature, automatic language detection, sentiment analysis, etc. to Improve (Orenga & Chalmeta, 2016). Like the SCRM Customer Communication computer system, the Big Data SCRM computer system will improve the branding, the improvement or development of sustainable products or services, and suitable commercial recommendations.
- *Business Intelligence SCRM computer system*: It will automate the Sustainable CRM performance measurement system proposed in section 3.4, collecting, storing and processing the data and displaying the indicators. The Business Intelligence SCRM computer system will be made up of software for calculating and visualizing indicators and a Data Warehouse that, through Extract, Transform and Load (ETL) Tools, will obtain the data to generate the indicators from the operational SCRM computer system, the SCRM Customer Communication computer system, and the Big Data SCRM computer system.
- *Strategic SCRM computer system*: It will automate the calculation of the value of the customer, generating the multivariable matrix proposed in section 3.3, while allowing both individual customers or groups of customers to establish and manage objectives. To do this, it will incorporate a cost/benefit calculation module to analyse the customer's economic profitability; a module for calculating customers' social and environmental sustainable purchasing preferences; a module to assess the sustainability of the customers, evaluating, through sentiment analysis, the opinions that are made about them on the Internet using the method proposed by Barbeito-Caamaño and Chalmeta (2020); and a module to define and manage objectives and actions by customer and customer segment. Thanks to the Strategic SCRM computer system, a company will be able to: Segment its customers based on their sustainability; Calculate economic, social and environmental benefits by segment or by each customer; Assess the strategy of relations with the customers from the social, environmental and economic points of view; Develop a multivariate customer value matrix and simulate customer flows in this matrix; and focus actions only on customers who really add value.

Figure 3 - SCRM computer system architecture
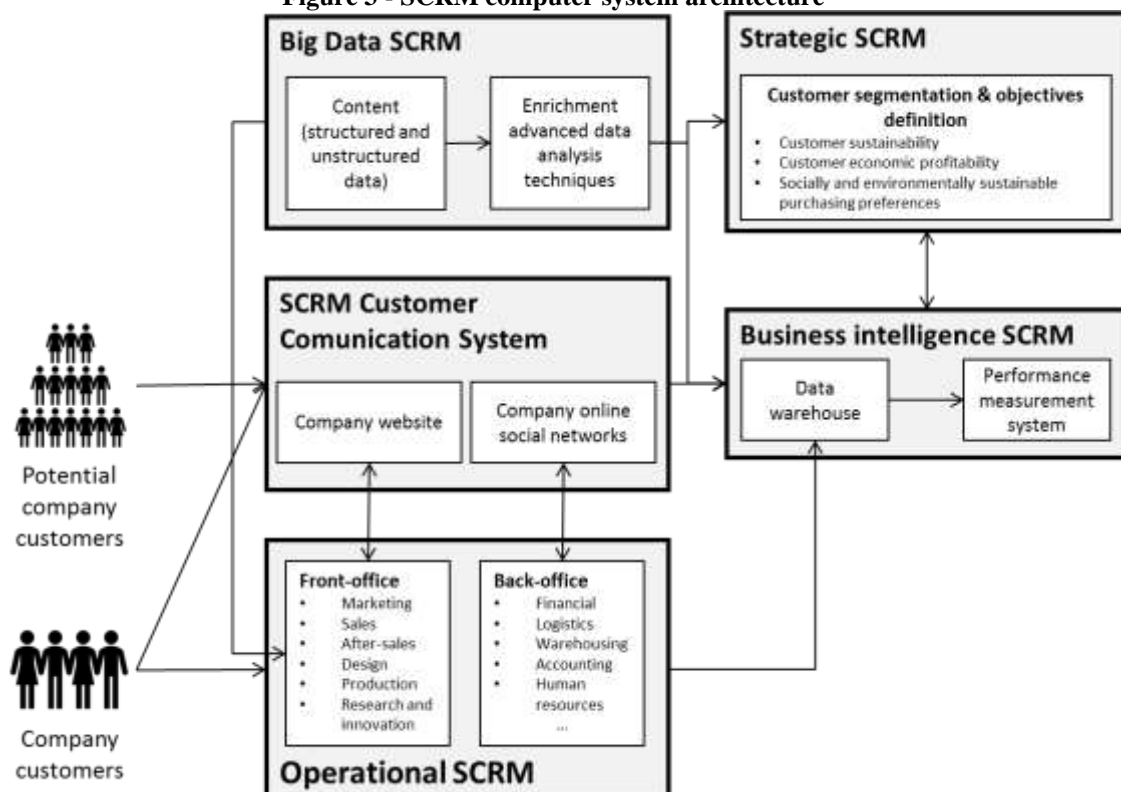
2.7 Monitoring

A continuous improvement process have to be implemented. To do this, the different indicators that were defined at phase I (Project management) must be monitored and action plans have to be established to correct any mismatches that may happen.

3 VALIDATION

The methodology was validated by three practitioners and three academics through a qualitative evaluation. The opinions of these experts in CRM and enterprise sustainability were collected through semi-structured and individual interviews. Experts were questioned about the usefulness of the methodology; the structure and organization of the methodology; the degree of detail, completeness, and understandability of the methodology; whether the methodology cover the whole SCRM project life cycle; the accuracy of the relation among phases and tasks; the mistakes and difficulties detected; suggestions for improving the methodology, and main strengths and weaknesses of the SCRM-IRIS methodology.

Experts highlighted that the methodology offers a valuable guide for developing and implementing SCRM in companies, emphasizing the overall understanding of the SCRM that is provided; the clarity in the detail of each one of the tasks to carry out; and the consideration of a continuous improvement process. On the other hand, the main weak points found were the necessity of examples of the indicators; and that it was necessary to consider the customer environmental and social impact in the multivariable matrix. The methodology was modified considering these suggestions.

4 DISCUSSION

This work contributes to SCRM development since the methodology proposed in this paper overcome the following research gaps in the state of the art of SCRM identified by different authors.

(1)　　　The necessity of methodologies to support the SCRM implementation throughout the whole project life-cycle (Danubianu & Teodorescu, 2016; Pohludka & Štverková, 2019), aligning company's sustainability strategy, company business processes, and smart information technologies (Saunila et al., 2019). However, according to the systematic literature review on SCRM carried out by Ferrer-Estevez & Chalmeta (2023), none of the existing SCRM studies propose such step-by-step methodologies. Only four papers address the proposal of methods or frameworks for SCRM development, but they are focused on different parts of the SCRM project: Osarenkhoe & Bennani (2007) propose a framework to define the SCRM strategy; Gil-Gomez et al. (2020) propose a guide to analyse how the three CRM business processes (sales, marketing, and after-sales) influence the company' sustainability; and Shukla & Pattnaik (2019) and Hasani et al. (2017) propose methods to assess the effects on SCRM adoption. This is the ***first contribution*** of the methodology to the state of the art. It guides practitioners in SCRM implementation, taking into account and integrating different issues that must be considered in the SCRM project such as strategy, customer segmentation, performance measurement system, business process reengineering, or technology.

(2)　　　Different studies have remarked the necessity of considering the three sustainability dimensions (economic, environmental, and social) unitedly in SCRM (Bahri-Ammari & Soliman, 2016; Müller, 2014; Petru et al., 2019). However, usually SCRM is focused only on one of these dimensions (Vesal et al., 2021). This is the ***second contribution*** of the SCRM-IRIS methodology. The methodology offers an inclusive vision of the sustainability concept, taking into account all sustainability dimensions in the strategy, customer segmentation, business process reengineering, performance measurement system, and computer systems development.

(3)　　　The majority of existing SCRM studies focused on business process redesign consider mainly marketing as the key business process to be redesigned (Ližbetinová et al., 2019), and only a few studies expand this consideration to sales and post-sales, the other two traditional CRM business process (Ahuja et al., 2019). However, SCRM also implies the redesign of other processes involved in the life-cycle of products or services, (not only marketing, sales and post-sales), such as supply chain management or design (Mohanty, 2018; Hazen et al., 2021). This is the ***third contribution*** to the state of the art of the methodology. It enhances the necessity of analyse all company business process (phase five of the methodology).

(4)　　　Companies uses different indicators to measure their sustainability and to report information to diverse stakeholders about their environmental and social performance, mainly through sustainability reports elaborated by the companies themselves, posts on social networks, and information disclosure on corporate websites. Different guides, such as the Global Report Initiative (GRI, have been developed to assist companies in this process (Halkos & Nomikos, 2021). However, this company sustainability communication is not actively used in SCRM practices to attract and retain sustainability-conscious customers (Tian et al., 2021), and to increase consumer awareness about company sustainability issues (Papadopoulo et al., 2022). This is because company sustainability communication is primarily unidirectional/expositive, instead of being bidirectional, measuring also customer expectations and interests about company sustainability, and therefore acquiring new knowledge and gaining full company value (Rodríguez & Chalmeta, 2020). To do this, in addition to a change in company customer strategy, it is necessary to develop new specific customer-oriented sustainability metrics (Müller, 2014).

This is the ***fourth contribution*** of this work to the state of the art. The SCRM-IRIS methodology proposes a SCRM performance measurement system with new customer-oriented sustainability metrics that, instead of being only informative about the company's sustainability issues, collect information about sustainability in customer experience and expectations, and is used for companies' decisions making. The SCRM performance measurement allows (1) monitoring customer satisfaction with the company's products and services in economic, social and environmental terms, (2) the effectiveness of the customers' strategy, (3) the degree of customer awareness about the company's sustainability, and (4) to compare the degree of sustainability of the company's products or services with purchase choices of other companies. This information, along with the strategic sustainability communication plan (phase three of the SCRM-IRIS methodology), allows companies to better satisfy the requirements of sustainable customers, attracting and retaining them as well as increasing consumer awareness about corporate sustainability issues.

(5)　　　SCRM requires segmenting clients on the basis of sustainability criteria, not only economic ones (Wassouf et al., 2020; Sarti et al., 2018). This is the ***fifth contribution*** of this work to the state of the art. It proposes the multivariable matrix, which analyses customers according to four variables: Customer environmental and social

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impact; Customer profitability; Socially sustainable purchasing preferences; and Environmentally sustainable purchasing preferences.

(6)   Different studies have proposed technologies to support SCRM such as e-CRM, Big Data or AI (Kumar et al., 2023; Kuz et al., 2017). However, they have been proposed in isolated way to solve specific SCRM problems (Yadav et al., 2020). Therefore, it is necessary to combine and integrate them to support all the functionality that the SCRM requires. This is the *sixth contribution* of the SCRM-IRIS methodology. The SCRM-IRIS proposes an integrated computer system architecture to support the SCRM requirements made up of five components that allow the execution of the company's business processes, the implementation of the strategic sustainability communication plan for customers, the use of Big Data to obtain different insights about customers, the automation of the Sustainable CRM performance measurement system, and the calculation of the value of the customer.

Therefore, this paper will make a significant contribution towards SCRM implementation. Therefore, society will benefit of the increase in the number sustainability aware customers, and more sustainable services, products, and business processes. This will imply, fairer treatment of employees and customers, and a reduction in the environmental impact of the business activity.

CONCLUSION

Companies' and consumers' and growing interest in sustainability has lead to transform CRM into SCRM, with the objective of creating more sustainable products and services, and at the same time, to attract and retain sustainability-awareness customers.

This work proposes a useful methodology to implement sustainable CRM in a company. The methodology makes it possible to understand better the scope, opportunities, and consequences of a SCRM project, as well as to get a greater control over the whole project life cycle. The methodology is organized in nine phases: Project planning, Sustainable Organizational Framework, Customer strategy, Sustainable CRM performance measurement system, Business Process Re-engineering, Human Resources, Computer system, Construction of the information system, and Monitoring.

Future research could consist in generating case studies of good practices that contemplate different industries and different contexts, which would facilitate the application of the methodology in specific companies. Moreover, the methodology has been developed for companies manufacturing final products. It would be interesting to research if any changes are needed in the methodology when the customer is a company. Other future research could be to define indicators to measure successful development and implementation of the different phases of the project. Finally, it would also be interesting to extend the methodology to consider not only the customers, but also all the company's stakeholders.

DATA AVAILABILITY STATEMENT
No data was used for this research

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