Article

A Conceptual Model of Factors Influencing Customer Relationship Management in Global Software Development: A Client Perspective

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Abstract: The software development industry or organizations increasingly emerging day by day have adopted global software development (GSD) practices due to the large significance of outsourcing. These industries face many challenges due to a lack of understanding customer perspective in the GSD environment. For any organization, the customer is the major stakeholder, and customer relationship management (CRM) plays a vital role in customer satisfaction with software development projects. These challenges create serious risks for any software development project's success. Thus, CRM is a crucial challenge in the success of software projects in the GSD environment. This research study aims to address the factors that negatively influence CRM implementation in the global context and proposes a conceptual model based on the identified factors for enhancing software product quality. The systematic literature review (SLR) phase investigates the potential barriers to CRM implementation in GSD. Based on identified barriers, an initial conceptual model is developed. The proposed conceptual model is validated using a questionnaire survey of the GSD industry and CRM practitioners of Pakistan. Statistical analysis and several suitable tests are also performed to develop the final conceptual model for CRM implementation in the GSD environment. This research is performed from the client's perspective. The results are promising and accommodating to avoid any software project failure due to customer-related issues in a GSD environment.

Keywords: customer relationship management; global software development; customer relationship management challenges; empirical study; distributed software development

1. Introduction

The recent advancement in the speed optimization technologies of software development enables organizations to extend their software development businesses and activities to the global environment known as global software development (GSD) [1]. GSD refers to the development of information technology (IT) products at geographically dispersed locations [2,3]. GSD is popular because of its low cost, access to rich resources, efficient time management, and adjacency to the software market [4,5]. However, despite many scientific contributions to the field of software engineering, GSD has many challenges due to cultural and demographic differences. These differences greatly impact communication, coordination, collaboration, trust issues, and project management during GSD. Moreover, these issues negatively affect the project success rate [6,7]. Numerous developing countries such as China, Pakistan, and India have developed GSD processes and businesses to prepare software at comparatively reasonable prices [8]. GSD is the standard procedure and has great potential in the software communities and other business activities such as support to the stakeholders [9]. However, GSD brings benefits for both vendors and customers in

effective product development, quality software, and low costs. However, it is also exposed to different challenges due to the dispersion of stakeholders, virtual teams, environmental factors, and cultural and language gaps. In the GSD environment, the quality of software development projects is a popular research topic [10]. The word quality here refers to the ability of any software that satisfies the customer's both functional and nonfunctional requirements [11].

The scientific community, as well as the software industry, presented research and models for the improvement of software quality [12]. These studies emphasize that customer issues affect the customer relationship process. Customer relationship issues negatively influence customer and organization interaction, especially in companies operating in a GSD environment [13]. For instance, software development organizations have observed that the software project quality can be improved by maintenance and development procedures [14]. Different procedures have been presented to improve the software quality from the perspective of customer satisfaction [15]. Thus, the customers are the essential stakeholders of any project [16], and customer relationship is the key to any organization's success model. Thus, the requirements management of these stakeholders is key to improving software quality. Customer relationship management (CRM) is a popular research area for software development organizations and CRM researchers in academia [17]. CRM refers to the practices and strategies an organization adapts to manage and analyze interactions with current and potential customers to improve customer care relationships and sustain sales growth [18–20]. CRM is a business approach that consolidates technology with marketing, aiming to capture and produce new consumers and retain the existing ones. Organizations implement CRM systems to manage customer relationships for survival in the marketplace. Zafar et al. [21] defined CRM as an integrated sale, marketing, and service approach that depends on well-organized establishment-wide actions. Babar et al. [22] stated that "the CRM is the association of business procedures and technology that seeks to recognize a company's customers from different perspectives to differentiate a company's products and services competitively".

Many customers spend more money to buy a company's products based on positive customer experience and feedback score [23]. Shah et al. [24] discovered that the expenditure of creating a new buyer is five times higher than retaining the present one. Since CRM is an effective way to obtain and scatter personalized customer knowledge, it has become an essential aspect of an organization's business strategy. CRM systems can help organizations boost their interactions with their buyers to improve and accelerate the response of the buyers' needs [25,26]. For maximum sales and competitive benefits, companies are trying to discover global solutions. The thriving enforcement of CRM in the GSD context is essential for mature sales growth and gaining significant advantages over business competitors. By analyzing and organizing the relevant customer data, CRM systems help develop leads, close deals, create strong customer relationships and customer retention, increase sales, and acquire customized services. Various studies [27] have been performed to improve the software development process for colocated organizations and companies operating in globally distributed environments [28,29]. For example, Niazi et al. [30] explored the affecting elements and benefits in CRM accomplishment. The authors considered a case study in which business process re-engineering (BPR) and organizational learning promoted successful CRM perpetration at the enterprise level. Kasemap et al. presented [31] a CRM success model consisting of CRM initiatives found by conducting an empirical study. The model includes success factors: process fit, customer data quality, system support, productiveness, customer satisfaction, and remunerations. However, the success factors of CRM were investigated from the developer's perspective. In [32], the authors extracted the key success factors of the CRM approach and formulated a model based on their findings. This study examined 11 critical success factors based on human, technology, and organizational components from the vendor perspective. Gheni et al. [33] described the dimensions concerns from the technical, cultural, and organizational points of view for successful CRM implementation in a colocated context. The investigation carried out by

Yao et al. [34] stated that client–vendor relationship development gets affected by factors such as communication and trust.

It is evident from the literature that CRM strategy has considerably improved customer relationships [35]. Despite the importance of CRM in many domains, there is no comprehensive study investigating the challenges of successfully implementing CRM in GSD. Little impactful research has been presented on the theoretical and implementation aspects of CRM focused on customer requirements and satisfaction [36]. Software organizations have acknowledged the importance of CRM and striving to obtain the maximum benefit out of it. Organizations operating in a distributed environment bear more challenges of successfully implementing CRM than those working in a colocated environment. Thus, the effective implementation of processes and the management of human resources and technologies will lead to sustainability in terms of sales growth and reduce operational costs. Furthermore, it is imperative to investigate successful customer relationship models and approaches for CRM practices [37]. This research study attempts to address the factors that can influence CRM implementation in globally distributed organizations and propose a conceptual model based on these identified and validated factors. Identifying the challenges towards CRM implementation will allow the organizations to overcome implementation failures and sales pitfalls to drag CRM back on track. This study also aims to identify the barriers to CRM implementation in GSD to effectively implement and maintain the relationship with global customers. Although the significance of CRM has been ascertained globally, the potential factors influencing a CRM system in a GSD environment have not been explored yet. Thus, this study also aims to discover the challenges of CRM in a globally distributed environment. The main contributions of the proposed study are presented as follows:

- An SLR is performed to investigate the potential barriers to CRM implementation in GSD.
- After identifying factors affecting the successful application of CRM in the GSD, an empirical study is conducted to determine the factors influencing CRM enforcement in GSD.
- In the first phase of the empirical study, an online questionnaire is developed and evaluated by the experts.
- In the second phase, after the development and validation of the survey questionnaire, feedback is fetched from the practitioners of the Pakistan IT industry based on GSD.
- Finally, a conceptual model is developed based on the identified factors to empirically illustrate the effects of CRM in the GSD environment for enhancing the software product's quality.
- Moreover, statistical tests are conducted to validate the performance of the proposed conceptual model using the data collected from the survey.

The study is organized as follows: the proposed research methodology is presented in Section 2. Section 3 analyzes the experimental results and highlights the findings of the proposed research study. The discussion and significance of the proposed research study are specified in Section 4. Finally, Section 5 concludes the given study with future work.

2. Research Methodology

This section explains the detailed design and methodology of the proposed research. SLR and an enterprise empirical study are selected as research methods to identify the barriers to CRM application and globally scattered companies. An empirical study was conducted to collect data from CRM practitioners with GSD experience and SLR to seek the research findings most neutrally.

2.1. Systematic Literature Review

An SLR is a diligent literature evaluation technique to address problems by investigating, evaluating, and integrating the results of all relevant individual studies addressing one or more research questions. An SLR is a review of a formulated question that uses

systematic and explicit methods to identify, analyze, select, and critically appraise relevant research [38]. The primary goal of SLR is to deliver a comprehensive brief of the existing literature related to the research investigation. SLR includes three phases [39]:

1. Planning the review phase is used for determining the developed plan for conducting SLR.
2. Conducting the review phase is used to develop search strings and acquire data from the literature.
3. Reporting the review phase is used to report all the outcomes of the previous phases.

2.1.1. Planning the Review

The review planning includes essential elements: research questions, data sources, search strings also called keywords, inclusion and exclusion criteria for articles, and quality criteria for article selection.

a: Research Questions

The establishment of questions is a vital element of SLR. The research questions drive the entire literature review methodology. The study questions for this study are as follows:

RQ1: What are the challenges to CRM in GSD?
RQ2: What are the challenges in the Pakistan industry related to CRM in GSD?
RQ3: Is there any variance between the identified factors in the SLR and those in an empirical study?

b: Data Sources

An iterative approach was employed to explore different scientific databases, digital libraries, and filtered relevant articles data. These libraries were selected carefully based on present research and a recommendation suggested by [39]. The data sources covered in this research study are as follows:

*   IEEE Xplore Library;
*   ACM Association for Computing Machinery;
*   Google Scholar;
*   Science Direct;
*   Wiley Online Library.

c: Search Strings

In this study, we extracted keywords from existing literature based on the research questions to develop the search strings. Boolean "AND" and "OR" operators were used to integrate keywords into a search string. Online databases were explored using these strings: ("Challenges" OR "Barriers" OR "Problems" OR "Factors" OR "Hurdles" OR "Difficulties") AND ("Customer Relationship Management" OR "CRM") AND ("Global Software Development" OR "GSD" OR "Distributed Software Development" OR "DSD").

d: Inclusion Criteria

The inclusion criteria for this study are given as follows:

*   For this research, we considered all the studies which discussed CRM-related activities in GSD, specifically those concerning the barriers to CRM implementation. Studies with empirical study assessments were preferred.
*   The selection of studies was based on the study types, such as conference or journal.
*   The selection of studies was based on the publication years ranging from 2010 to 2022.
*   Articles were selected based on the English language.

e: Exclusion Criteria

The research studies that met the below-defined criteria were excluded:

- Reports written in other than English language and lacking full-text availability were excluded.
- In addition, articles and reports that did not examine CRM in the global software environment were also eliminated from the study.
- Articles that discussed barriers other than CRM in GSD were also excluded from the analysis.
- The duplications of the same studies were excluded.
- Book chapters, blogs, and white papers were excluded.

f: Quality Criteria for Study Selection

The selected articles were assessed to determine their quality simultaneously with other phases such as information, evidence, and statistics gathering. A quality checklist was generated to qualitatively and quantitatively assess the selected data. An informal external review was also carried out to confirm the quality sufficiency of selected articles. The following guidelines [35] were kept in mind while developing this checklist. The quality assessment checklist is given as follows:

QA checklist questions:

- **QA1**: Does the study approach respond to research questions?
- **QA2**: Does the researcher examine the barriers of GSD?
- **QA3**: Does the study discuss CRM in the GSD environment?
- **QA4**: Are the findings presented in the study?

For each given question **Q1** to **Q5**, the evaluation was performed as follows:

- Studies that addressed all the research questions were marked with a score of point 1.
- A score of 0.5 was given to the studies addressing incomplete answers to questions.
- Studies that failed to address any of the given questions were marked with 0 score points.

2.1.2. Conducting the Review

The conducting of the review process includes the following elements: initial study selection, data extraction, and synthesis.

a: Initial Study Selection

In the first phase of the tollgate approach, 1036 articles were selected for the analysis from the digital databases through search strings. After performing addition and elimination based on title, abstract, introduction, and full text, 46 articles were filtered to be added in an analysis. Figure 1 shows the study selection based on the tollgate approach.

The chosen data were further filtered using the tollgate approach [35]. The tollgate approach includes five steps, as shown in Table 1.

Step 1: Exploring relevant articles.
Step 2: Addition and elimination based on the title and abstract.
Step 3: Addition and elimination based on the introduction and conclusion.
Step 4: Addition and elimination based on the full text.
Step 5: In the end adding the selection of data to the SLR.
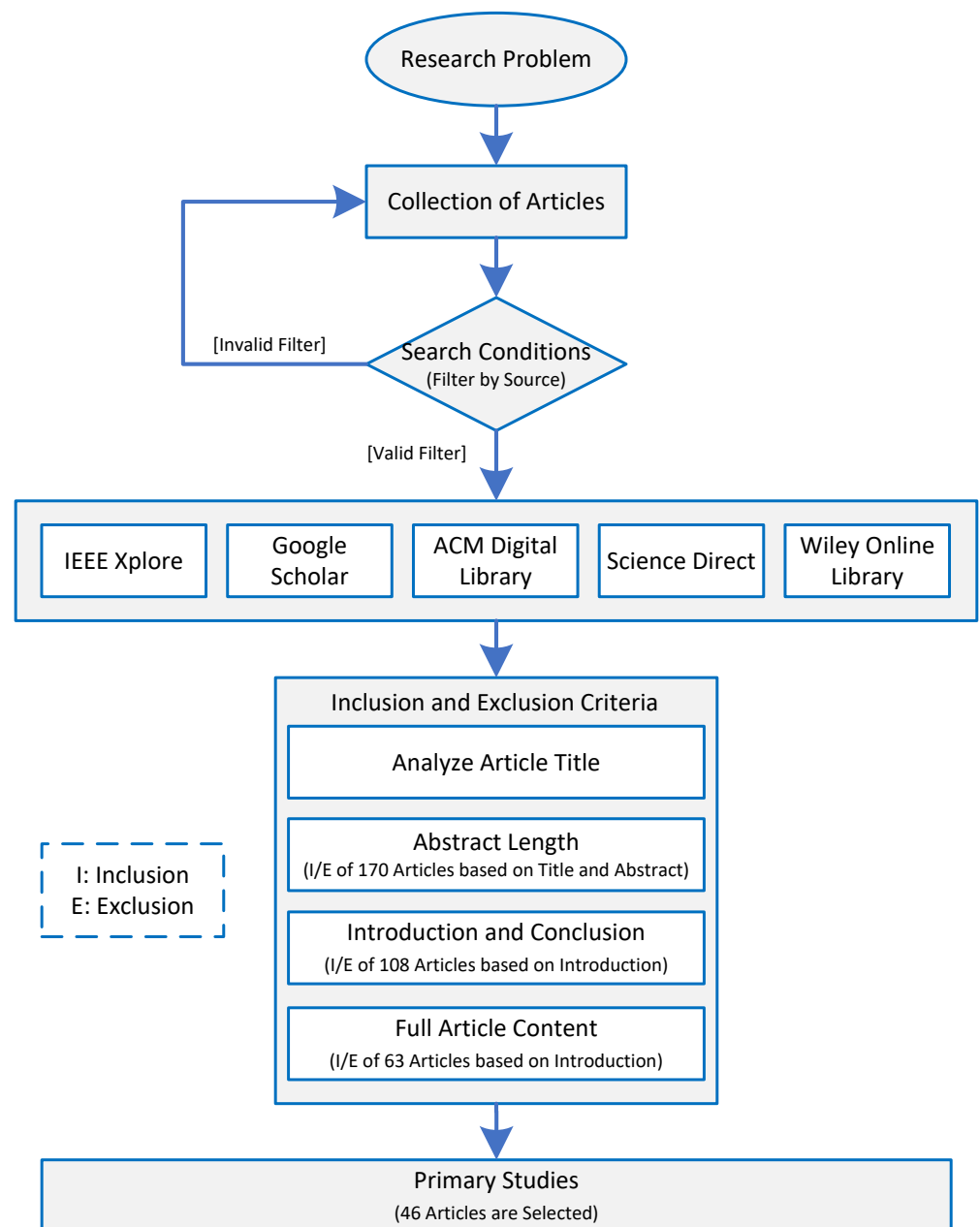
Figure 1. Methodology of articles inclusion and exclusion based on the tollgate approach.

Table 1. Selection of articles based on tollgate approach.

E-Databases	Step 1	Step 2	Step 3	Step 4	Step 5
ACM	16	8	7	5	4
Google Scholar	560	33	23	20	17
IEEE	300	56	34	17	13
Science Direct	104	48	29	18	12
Wiley Online Library	56	25	15	3	0

b: Data Extraction

In this research review, we filtered each article's title, study type, and research method to answer the research questions. Following the selection phases of the tollgate approach,

we extracted the final primary data to conduct the SLR. Articles were selected based on relevance in the first phase of the tollgate process. In the second phase, articles were selected and eliminated based on title and abstract. We extracted studies based on the introduction and conclusion in the third phase. Based on the full text, selection and deduction were carried out in the fourth phase of the tollgate approach. In the final phase, a selection of primary studies was performed.

c: Data Synthesis

Several factors were identified that negatively impact the successful execution of CRM in GSD. The list of factors was extracted from the final selection of primary studies, and the research questions were also evaluated from these extracted articles.

2.1.3. Reporting the Review

The review reporting phase includes essential elements: quality assessment, temporal distribution, and research methods.

a: Quality Assessment

The studies were selected after performing quality criteria. The selected studies were chosen based on the QA checklist. The quality analysis for selected studies was presented in Table 2.

Table 2. Summary of quality assessment for selected studies.

Reference	QA1	QA2	QA3	QA4	Total
[35]	0.5	1	0	1	2.5
[40]	0.5	1	0.5	1	3
[41]	0.5	1	0	0.5	2
[39]	1	0.5	1	1	3.5
[42]	1	0.5	0.5	0.5	2.5
[28]	0.5	0.5	0.5	0.5	2
[33]	1	1	1	1	4
[29]	1	0.5	0.5	1	2
[43]	0.5	1	0	0.5	2
[44]	1	1	0	0.5	2.5
[45]	0.5	1	0	0.5	2
[46]	0.5	1	0.5	0.5	2.5
[47]	0.5	1	0	1	2.5
[48]	0.5	1	0	0.5	2
[49]	0.5	1	0	0.5	2
[50]	0.5	1	0.5	0.5	2.5
[51]	1	1	0	0.5	2.5
[52]	0.5	1	0	0.5	2
[53]	0.5	0.5	0	1	2
[54]	0.5	1	0	1	2.5
[55]	0.5	1	0	0.5	2
[56]	0.5	1	0	0.5	2
[57]	0.5	1	0	0.5	2

Table 2. *Cont.*

Reference	QA1	QA2	QA3	QA4	Total
[58]	0.5	1	0	0.5	2
[59]	0.5	1	0	0.5	2
[60]	0.5	1	0	0.5	2
[61]	0.5	1	0	0.5	2
[62]	0.5	1	0.5	0.5	2.5
[63]	0.5	1	0	0.5	2
[64]	0.5	1	0	1	2.5
[65]	1	1	0	1	3
[66]	0.5	1	0	0.5	2
[67]	0.5	1	0	1	2.5
[68]	0.5	1	0.5	0.5	2.5
[2]	0.5	1	0	0.5	2
[69]	0.5	1	0	0.5	2
[70]	0.5	1	0	0.5	2
[71]	0.5	1	0	0.5	2
[72]	0.5	1	0	0.5	2
[73]	0.5	1	0.5	0.5	2.5
[74]	1	1	0	0.5	2.5
[75]	0.5	1	0	0.5	2
[59]	1	1	0	0.5	2.5
[76]	1	1	0	0.5	2.5
[77]	0.5	1	0	0.5	2
[78]	1	1	0	0.5	2.5

According to a study presented in [35], an article with quality which was equal to or more than 50% should be selected. Those studies that were not selected, which did not answer the selected QA checklist and their total scores were lower than two, were rejected, as it is mentioned in [35] that the quality criteria score must be 50%. In addition, studies that focused on conveying customer issues faced in the GSD environment were added. A total of 46 studies were included based on quality criteria, and the remaining studies were rejected, as they were not following the quality criteria for this research.

b: Temporal Distribution of the Selected Primary Studies

The entire extracted studies were published from the year 2010 to the year 2020. Out of 46 studies, 15 articles were published from 2010 to 2014, 17 articles were published from 2015 to 2017, and 14 articles were published from 2018 to 2020. Figure 2 presents the distribution of studies.
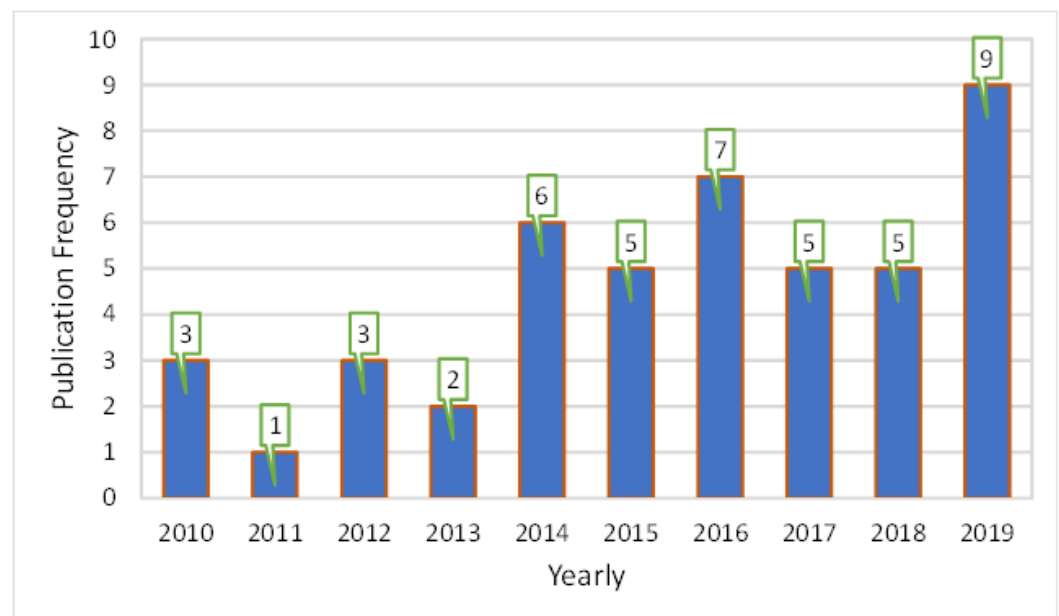
Figure 2. Yearly distribution of publications for the proposed study.

c: Research Methods

The extracted information from the last phase of the tollgate approach included 45% empirical studies, 25% systematic literature reviews, and 11% theoretical studies, 10% were based on framework preposition studies, and the remaining 9% were exploratory studies. Figure 3 shows the distribution of selected studies.
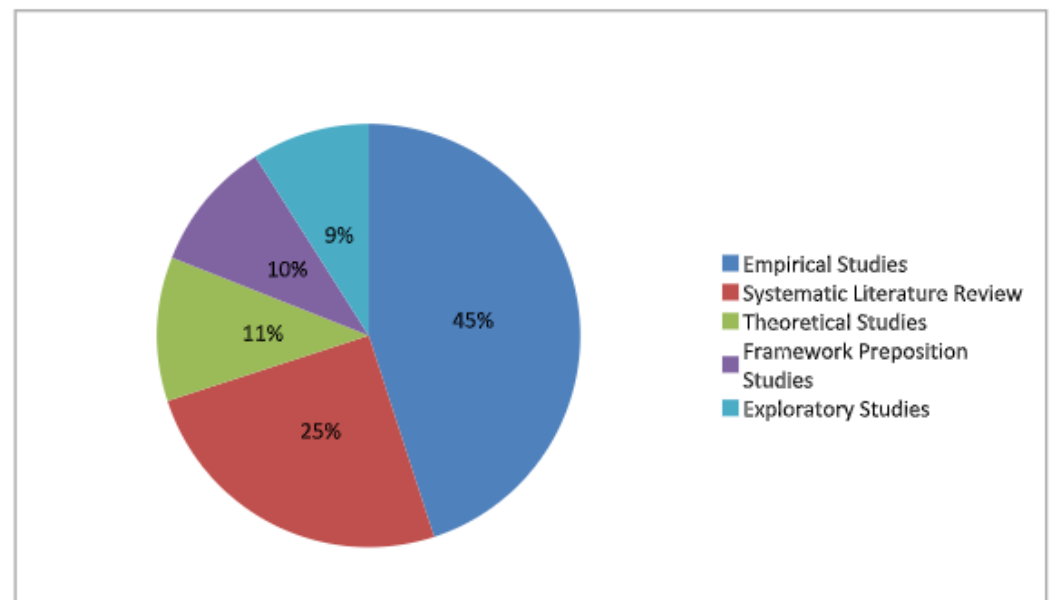
Figure 3. Percentage-wise distribution of the selected studies based on study types.

2.2. Proposed Conceptual Framework and Hypothesis Development

This subsection provides the conceptual framework, including its hypothesis. The conceptual model of this research consists of eleven exogenous variables and an endogenous variable. The exogenous variables are communication issues (LC), language differences (LD), policies, rules, and regulations (PRG), delay in services (DEL), technical issues (TEC), lack of experience and domain knowledge (EXP), lack of collaboration and coordination (CC), culture differences (CD), temporal differences (TD), lack of mutual understanding

(MU), and geographical distance (GD). All these variables negatively affect the CRM in the GSD environment, which is further considered an endogenous variable. Figure 4 illustrates the conceptual model of the proposed research review.
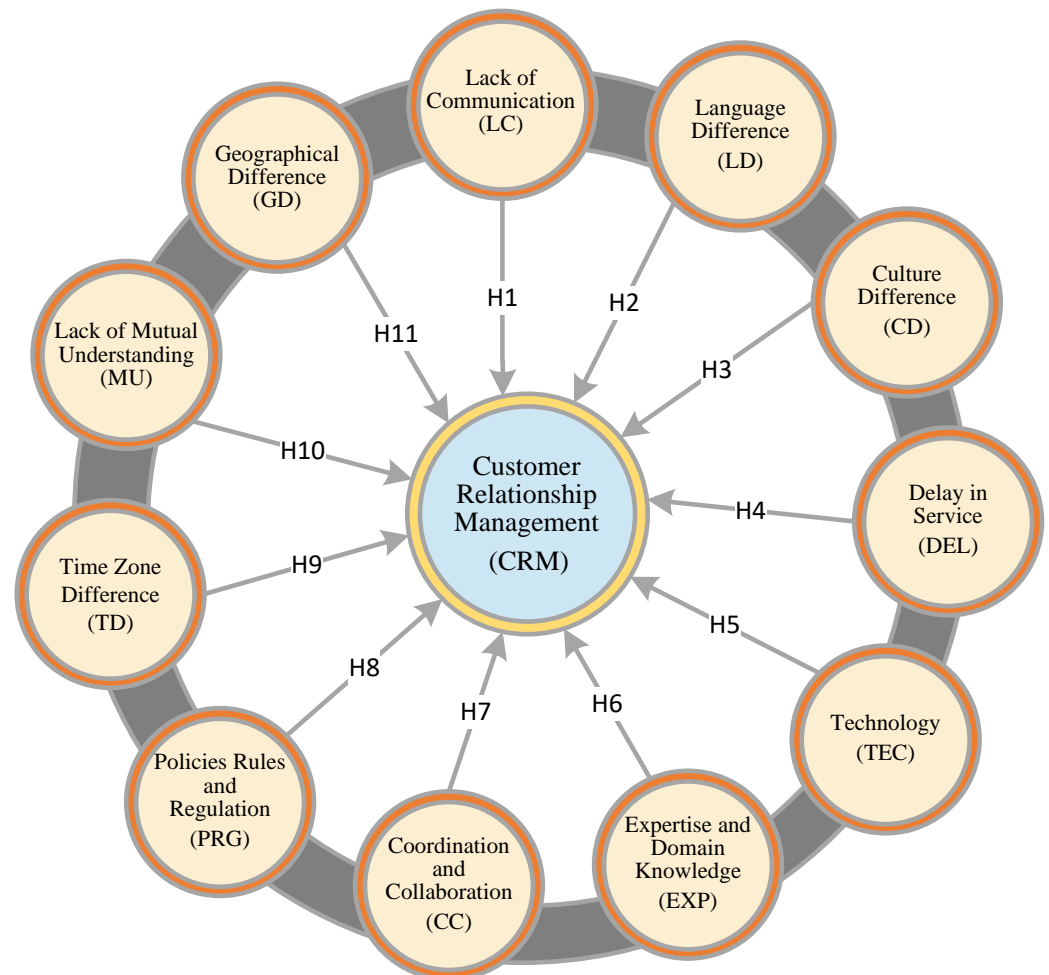

Figure 4. Proposed Conceptual Framework for CRM.

2.2.1. Lack of Communication Selection

In this modern era, GSD has become essential for the software community [79]. Communicating in the world of the mixture is complicated. Problems in communication are the central issue of globally distributed customers that organizations face which badly affects CRM [34]. An element of communication binds organizations dealing with customers globally, and any problem in communication will affect CRM badly. This has many other aspects, such as less synchronization and telecommunication bandwidth. Fewer synchronizations also affect CRM in GSD as communication expands by using asynchronous communication tools, e.g., email and time-zone, to name a few, and maybe some important content is required to be communicated. Telecommunication bandwidth also affects the communication between vendors and customers because many contents or requirements are unspecified, which affects CRM implementation. Poor telecommunication bandwidth affects the quality of information exchanged between the customers and vendors and CRM in GSD [74].

2.2.2. Language Difference

In distributed environments, language differences always create problems. Language differences are how a customer and vendor communicate regarding the project requirements. English is the primary language used widely on national and international

platforms. Language also creates hurdles in GSD [74]. Language difference creates a lot of hurdles, such as understanding client's specifications, which result in the dissatisfaction of customers, which in turn affects CRM implementation. The language barrier also leads to work delays, affecting CRM implementation in GSD. The contextual difference is the variety of meanings of the same word. This mixture of meanings creates misunderstanding between customers and organization, which directly affects CRM badly [56]. Contextual differences reduce adequate communication and sometimes show a lack of knowledge from the customer's perspective [66]. Contextual differences also cause many more issues in gathering information from customers, which negatively affects the time duration of a project and, most importantly, customer dissatisfaction, which affects CRM [63].

2.2.3. Policies, Rules, and Regulations

Every organization has its policies, rules, and regulations [61]. In fact, some policies, rules, and regulations are made by the government of every country. Keeping in view these rules when associating with customers globally, some of the customer requirements and specifications are totally against the organization or government rules and regulations [75]. This results in customer dissatisfaction, which affects CRM implementation. Occasionally, due to these reasons, customers show less interest in organizations [59]. Moreover, strict policies and regulations do not allow customers much freedom to express their needs and desires, which affects CRM implementation.

2.2.4. Delay in Services

Service delays are also a main cause of customer dissatisfaction [39]. Furthermore, sometimes distributed teams cause a severe issue in the project time duration [80]. More importantly, the communication between stakeholders globally is disturbed due to different working days, time differences, and geographical distances, causing delays in services that poorly affect the CRM environment in GSD [33]. Moreover, different holidays and disagreements between customers and vendors also lead to delays in services [29].

2.2.5. Technical Issues

In GSD, technical issues are the other major issue in associating globally to initiate communication [76]. They involve communication infrastructure, tools, techniques, conflicts on the preferred technology, interspersed because of the incompatibility of artifacts, and the total price required to initiate communication by using attainable technologies [40]. In contrast, communicating causes a barrier to communication worldwide. It creates misunderstandings between customers and organizations that become hurdles for the success of project implementation, affecting the CRM process [33]. Communication infrastructure and tools used by organizations depend on electronic communication; any downtime may disturb the communication which causes the flow of work, for example [80]. Technical incompatibilities and resources also arise while working globally with distributed customers and these issues affect CRM implementation [63].

2.2.6. Lack of Experience and Domain Knowledge

This issue refers to the developers who do not have any experience or domain knowledge about customers' desired projects, and the lack of information and domain knowledge causes unbalance that leads to the failure of the project [4]. The lack of awareness about advanced tools and software affects customers' needs, eventually affecting the CRM process. In GSD, meeting specifications is a major part of developing any software project [33], and this issue refers to the customers' details of requirements about the expected project [76]. Due to this issue, the developers make decisions based on previous experience or guess the customers' actual requirements, which results in project failure [59]. In addition, technical resources directly affect on-time delivery or actual project duration, creating trust issues and misunderstandings that poorly affect CRM performance. Because of all this, customers show less interest and create issues in developing CRM in GSD [34].

2.2.7. Lack of Collaboration and Coordination

Collaboration and coordination from the customer's side are crucial during collecting project requirements [78]. However, working globally with distributed customers, less collaboration and coordination causes a lack of communication and mutual understanding [68]. Sometimes, due to a lack of coordination, it becomes difficult to understand customer issues that affect CRM development. The lack of two-way communication channels can also affect a project, resulting in project failure and CRM [47]. In addition, the lack of online coordination and collaboration increases customer service costs, which negatively influences the implementation process of CRM.

2.2.8. Culture Difference

Each culture is defined by its styles, behaviors, beliefs, standards, and moral values, which can elicit communication issues when different cultures and individuals interact with one another [31]. Cultural differences cover national, organizational, political, religious, and moral principles, due to which possibilities of misunderstandings increase, which causes negative impacts on the implementation of CRM [5]. Because of the difference in culture, there are different working cultures (cultural festivals) and working environments that eventually affect CRM implementation. Socioeconomic diversity is a group of people with different incomes, social backgrounds, ethics, and education, to name a few examples. Working globally with distributed customers of different backgrounds makes it very hard to do projects, especially in education; it is also harder to create successful CRM [6]. Moreover, this socioeconomic diversity creates many hurdles in understanding and getting the view of the project from the customer perspective and badly affects CRM implementation [63].

2.2.9. Time Zone Difference

Time zone difference is the time difference between customers and organizations working globally [39]. Organizations working globally with distributed customers located at two locations have different time zones that create communication and coordination problems [39]. An organization's delay in responses and feedback becomes problematic for customers dealing with distributed organizations located globally [33]. Time zone difference causes many issues related to hindering the exchange of views. Working in a GSD environment, sometimes, one hour can create a major issue for the customers. In GSD, all these issues are caused by time zone differences and badly affect the CRM environment. Sometimes working in GSD time zone differences increases the effort for customers to initiate contact with the organization [63].

2.2.10. Lack of Mutual Understanding

In distributed GSD, customers from various environments have different views and ways of thinking that lack mutual understanding with organizations and influence the CRM negatively [33]. Talking about this issue, sometimes there is also a possibility of tacit knowledge, which also creates misunderstandings between the client and vendor sides [80]. The lack of mutual understanding can also delay the project duration, negatively affecting the CRM. Therefore, for project success, there should be a good understanding between both the client and vendor sides [33].

2.2.11. Geographical Distance

Geographical distance is explained as the physical dispersion between customers and vendors distributed globally [31]. In GSD, the major issue that arises due to geographical distance is a face-to-face meeting which causes a lack of trust and a misunderstanding of requirements and hinders communication, negatively affecting CRM. Working globally with distributed customers is tough to gather project details through online mediums, which leads to data loss during transferring because of small communication bandwidth [80]. Working offshore leads to a lack of trust from the customer perspective, which badly affects CRM. The lack of trust from the customer's side in GSD also affects CRM, and for

organizations, it becomes harder to retain the customer [33]. In GSD, customers have no previous experience with the organization, which causes trust issues. Geographical distance retards communication in GSD, which causes trust issues, and it is hard to develop trust [34]. Sometimes, misunderstanding creates trust issues that affect CRM development.

2.3. Empirical Analysis of Conceptual Framework

In this subsection, the details of the empirical investigation that was conducted and their outcomes are presented. In addition, a survey was conducted to answer RQ2 in software organizations in Pakistan based on GSD.

2.3.1. Measurement and Procedure for Data Collection

The quantitative research method was used in this study to explore and define the challenges of affecting CRM in GSD. Keeping in view the outcomes of SLR, an online questionnaire survey was produced to carefully evaluate the dominating barriers that speedily deteriorate the global working relations between the two (customers and vendors). These questions were specifically framed regarding the challenges identified during the SLR. The obvious reason behind the survey was to obtain fresh information on the current situations and, simultaneously, obtain the information that is hard to collect from observation [43]. In the questionnaire survey, closed-ended questions were prepared and sent to the organizations' participants with a particular experience in CRM implementation in GSD. Therefore, responding to the closed-ended questionnaire was easy for the participants [56]. At the early stage, a simple questionnaire was developed, which was further purified by executing various validity tests and implementing the pilot study.

For the questionnaire, we selected a five-point Likert scale with the feasible responses: "Strongly agree", "Agree", "Neutral", "Disagree", and "Strongly Disagree". According to most of the authors of [57,58], there is no defect in the inclusion of the "Neutral" option in the Likert scale. Moreover, incorporating the "Neutral" point results in unbiasedness; participants are given a free hand to express their opinions as per their experiences [59].

Before conducting a questionnaire survey, the pretesting of the questionnaire is necessary. This helps to test the defects and restrictions of the questionnaire. The reliability analysis of the survey is assessed in terms of face validity and content validity by a specialist. In face validity, the authorities regard the elements stated in a sample and appreciate the validity of the test which is being retrieved on the face of it [59]. On the other hand, content validity requires the experienced staff who assess the accuracy, comprehensibility, and wholeness of the survey questionnaire elements and agree on what elements must exist in the final questionnaire survey [60]. A sample of the questionnaire is shown in the Appendix A table.

2.3.2. Respondents

This research aimed to explore the challenges of CRM implementation in GSD projects. For that, we targeted the participants of GSD organizations and IT industries in Pakistan. The participants include a CRM manager, team manager, project manager, support engineers, IT technicians, analysts, developers, and others. The participants were gathered through the snowball technique. They were approached differently through emails, LinkedIn, and Facebook; some were collected through participants' colleagues. The data collection period was from 2 May 2020 to 20 July 2020 from different GSD organizations that work on CRM implementation. The entire process of collection of the empirical data lasted for 2.5 months. The questionnaire was distributed to a total 350 participants, out of which 222 were completed accurately. All the responses were viewed, and the incomplete entries were excluded.

2.3.3. Data Analytical Approach

PLS-SEM (partial least square-structural equation modeling) has been used in this research paper. The variables are formative, as recommended by [65]. Therefore, this method

is suitable for this conceptual framework. PLS-SEM has two models (the structural model and the measurement model), and this model is a multivariate analysis method. The association between the latent variables is known as the structural. In contrast, the measurement model presents the relation between the latent variables and the data collected from the questionnaire survey [63]. SEM helps to evaluate the relationship between endogenous and exogenous variables one time instead of doing it individually [43]. The survey sample size of this research study was more than the suggested sample size of 100–150 participants, which is needed for gathering reliable results in the structural equation option [49]. The tool used to implement the data gathered through the questionnaire survey was WrapPLS version 6.0 by Kock for analyzing the results statistically [50].

3. Results and Findings

In this section, a detailed discussion is presented on the findings of SLR that affect CRM in GSD. After that, the empirical analyses of the conceptual framework are discussed. Finally, the survey is analyzed and examined to validate the conceptual framework, and the results are compared.

3.1. Results from SLR

This subsection is come up with the issues that affect CRM in GSD as the factors identified in the systematic literature review related to customers. The customers' issues and the factors that affect the CRM in GSD are discussed in detail to answer **RQ1**. From 46 primary studies, 11 factors were identified from the SLR, which were further fed-in frequencies and percentages in Table 3. It can be observed that the frequency of the factor lack of communication achieved a higher frequency of 34 among all other listed factors. Similarly, language differences were also reported in 33 studies out of 46, which significantly affects CRM. Based on the given summary, it was found that the three factors lack of communication, language differences, and cultural differences negatively influence the implementation of CRM. Time zone difference also moderately affects CRM. In contrast, technical issues and policies, rules, and regulations influence CRM slightly compared to other listed factors.

Table 3. Summary of factors affecting CRM.

Factors	Frequencies	Percentages
LC	34	75.1
LD	33	73.3
CD	32	71.1
DEL	15	33.3
EXP	14	31.1
TEC	7	15.5
CC	15	55.5
PRG	5	11.1
TD	24	53.3
MU	11	24.4
GD	31	68.8

H1: A lack of communication affects CRM in GSD.
H2: Language differences affect CRM in GSD.
H3: Culture differences affect CRM in GSD.
H4: Delays in services affect CRM in GSD.
H5: A lack of experience and domain knowledge affects CRM in GSD.
H6: Technical issues affect CRM in GSD.
H7: A lack of coordination and collaboration affects CRM in GSD.

H8: Policies, rules, and regulations affect CRM in GSD.
H9: Time zone difference affects CRM in GSD.
H10: A lack of mutual understanding affects CRM in GSD.
H11: Geographical distance affects CRM in GSD.

3.2. Results of Empirical Study

In this subsection, the details of the empirical investigation that was conducted and its outcomes are presented. A survey was conducted to answer RQ2 in software organizations of Pakistan based on GSD. In addition, each hypothesis and its outcomes was examined and analyzed.

3.2.1. Demographic Profile of Respondents

While conducting an empirical investigation, a thorough analysis of a survey is essential. A close view of the participants, such as essential information related to an organization, helps conclude more significant results [81]. In this study, we gathered participants' demographic and organization-related information to obtain more precise and authentic questionnaire survey results. This section apprises us with the empirical investigation carried out in the current study. The survey was dedicatedly carried out regarding **QR2**. The correct sample size for PLS-SEM is 200 or above [82]. A total of 222 samples was carried out during the present research work. Table 4 shows the respondents' demographic characteristics, including gender, education, working experience, and position.

Table 4. Summary of participants demographic.

Demographics	Participants	Frequency	Percentage
Gender	Male	210	94.5
	Female	12	5.4
Education	Bachelor's degree	152	68.4
	Master's degree	63	28.3
	M.Phil degree	5	2.2
	Ph.D graduate	2	0.99
	Other	0	0
Position	CRM manager	20	9.0
	Team manager	21	9.4
	Project manager	22	9.9
	Support engineers	29	13.0
	IT technicians	27	4.0
	Analysts	20	20.0
	Developers	38	17.1
	Other	20	9.0
Working experience in GSD	1–3 years	122	54.9
	4–7 years	58	26.1
	8–10 years	20	9.0
	More than 10 years	22	9.9

3.2.2. Organization-Related Information

It is vital to have the domain knowledge of the software company from where a questionnaire is conducted. Table 5 mentions the type of project and the number of employees in that organization. It is noteworthy to examine what type of project was

established in the GSD context and how many employees were employed in that software company. The main focus of this research is GSD-based software companies that handle CRM; therefore, we also have to specify the type of project these organizations provide.

Table 5. Organization-related information of the conducted questionnaire.

Organization Information	Participants	Frequency	Percentage
Nature of project	Software development	121	59.9
	Web development	66	32.6
	Other	15	7.4
Number of employees	10–25 employees	28	13.9
	26–50 employees	26	12.9
	51–80 employees	33	16.3
	More than 80	115	56.9

3.2.3. Descriptive Statistics

In this section, the data of the questionnaire descriptive statistics for each construct item are presented. Mean, standard deviation, skewness, and kurtosis were calculated for all items of the respective construct, as shown in Table 6. The CRM factors of the respondents were estimated by eleven questions followed by a 5-point Likert scale. This scale extends from "strongly agree" (1) to "strongly disagree" (5). The mean score of the eleven CRM factors was between 1.86 (0.853) and 2.82 (1.308).

Table 6. Descriptive statistics of CRM factors.

Item	Mean	Std. Dev	Skewness 3	Kurtosis
CRM1	1.93	0.835	0.929	1.122
CRM2	1.86	0.853	1.156	1.760
CRM3	2.74	1.204	0.239	−0.808
CRM4	2.11	1.933	0.821	0.541
CRM5	2.82	1.308	0.391	−0.975
CRM6	1.93	0.835	0.929	1.122
CRM7	2.49	1.160	0.445	−0.755
CRM8	2.82	1.308	0.391	−0.975
CRM9	2.59	1.011	0.203	−0.543
CRM10	2.46	1.075	0.271	−0.717
CRM11	2.74	1.111	0.113	−0.898

3.2.4. Quantitative Analysis

The model used in this study is partial least square structural equation modeling (PLS-SEM). In this research, a two-step process was used, i.e., the measurement model and the structure model. In the first step, to assess the measurement model, we had to check the correctness and reliability of the construct. In the second step, the structural model was tested which indicated the relationship between the constructs. As the model assessment offers a further authentication of results for path coefficients related to direct effects, a stable sampling technique was used in this study [59].

a: Measurement Model

The conceptual model introduced in this research study is formative and comprises eleven exogenous constructs identified as discussed earlier and one endogenous construct,

i.e., CRM issues in the GSD environment. Therefore, PLS Model B is more productive for a solid evaluation of the formative measurement stated by the authors of [83]. That is why, in this research study, the algorithm of the formative model was PLS Model B and was used for the assessments. To assess the verification of the formative construct, a variance inflation factor (VIF) was obtained. The following are the criteria for the evaluation of VIF:

- For the acceptance of VIF, it must be less than five and the ideal value is lower than three [84].
- The acceptability value of tolerance is equal to, or less than, 0.989 [82].
- For the estimation of the reliability of the formative, construct the loading and weights of the index, and their amount of importance is to be inspected and rechecked [85].
- The acceptability of an item having a factor loading of more than >0.50 is recommended [82].

Table 7 shows that all the formative constructs experience that the criteria of VIF, tolerance, loading, and the weights of the indicators of the constructs are significant.

Table 7. Evaluation of formative measurement model.

Items	Loadings	Weights	Significance	Full Colinearity	Tol	VIF
LC1	0.719	0.356	<0.001	1.376	0.557	1.796
LC2	0.824	0.449	<0.001		0.486	2.058
LC3	0.775	0.482	<0.001		0.582	1.717
LD1	0.82	0.402	<0.001	1.441	0.507	1.972
LD2	0.837	0.378	<0.001		0.483	2.071
LD3	0.849	0.417	<0.001		0.470	2.129
CD1	0.72	0.316	<0.001	1.245	0.632	1.582
CD2	0.83	0.397	<0.001		0.548	1.826
CD3	0.857	0.517	<0.001		0.488	2.050
DEL1	0.767	0.405	<0.001	1.621	0.527	1.898
DEL2	0.808	0.376	<0.001		0.451	2.218
DEL3	0.86	0.449	<0.001		0.403	2.484
EXP1	0.861	0.381	<0.001	1.081	0.456	2.191
EXP2	0.868	0.422	<0.001		0.490	2.042
EXP3	0.824	0.371	<0.001		0.513	1.950
TI1	0.853	0.307	<0.001	1.110	0.402	2.486
TI2	0.906	0.48	<0.001		0.424	2.357
TI3	0.86	0.353	<0.001		0.450	2.221
CC1	0.806	0.367	<0.001	1.155	0.505	1.979
CC2	0.874	0.439	<0.001		0.473	2.116
CC3	0.833	0.385	<0.001		0.481	2.078
PRG1	0.788	0.268	<0.001	1.916	0.423	2.362
PRG2	0.9	0.42	<0.001		0.354	2.828
PRG3	0.897	0.458	<0.001		0.360	2.779
TD1	0.772	0.401	<0.001	1.345	0.640	1.564
TD2	0.822	0.406	<0.001		0.446	2.241
TD3	0.834	0.429	<0.001		0.464	2.156
MU1	0.866	0.377	<0.001	1.846	0.365	2.736
MU2	0.906	0.379	<0.001		0.320	3.121
MU3	0.87	0.379	<0.001		0.440	2.274
GD1	0.863	0.335	<0.001	1.944	0.444	2.251
GD2	0.907	0.387	<0.001		0.381	2.627
GD3	0.868	0.414	<0.001		0.536	1.864

Table 7. *Cont.*

Items	Loadings	Weights	Significance	Full Colinearity	Tol	VIF
CRM1	0.73	0.186	<0.001	3.934	0.882	2.231
CRM2	0.48	0.13	<0.001		0.875	1.143
CRM3	0.435	0.137	<0.001		0.855	1.169
CRM4	0.599	0.175	<0.001		0.679	1.472
CRM5	0.583	0.194	<0.001		0.983	1.017
CRM6	0.73	0.186	<0.001		0.710	1.409
CRM7	0.437	0.118	<0.001		0.855	1.170
CRM8	0.583	0.194	<0.001		0.901	1.110
CRM9	0.513	0.165	<0.001		0.783	1.277
CRM10	0.468	0.145	<0.001		0.686	1.457
CRM11	0.571	0.168	<0.001		0.667	1.499

Therefore, formative constructs are valid, which is shown by this. Furthermore, the assessment of the measurement model shows statistically significant results.

b: Structural Model

The path coefficients with effect size and R2 coefficient value of the endogenous construct, i.e., CRM issues and *T*-values, were computed using Wrap PLS 7.0 for the hypothesis and assessment of the structural model. The threshold of the *T*-value should be more significant than 1.64 or 1.96 [73], and it could be calculated by the path coefficient divided by standard errors. For the threshold, the *P*-value was <0.05 [63]. The algorithm used for assessing the structural model was Wrap 3, tested as the finest algorithm for computing the path coefficient of the formative model type. The significance of hypothesis testing, effect size, *T*-values, and path coefficients are discussed in detail in Table 8.

Table 8. Evaluation of formative structural model.

Hypothesis Testing	Path Coefficient	SE	*T*-Value	*p*-Value	ES	Results
H1:LC⇒ CRM	0.248	0.064	3.875	*P* < 0.01	0.148	Supported
H2:LD⇒ CRM	0.144	0.065	2.215	0.01	0.079	Supported
H3:CD⇒ CRM	0.113	0.066	1.712	0.04	0.058	Supported
H4:DEL⇒ CRM	0.199	0.065	3.056	*P* < 0.01	0.119	Supported
H5:EXP⇒ CRM	0.300	0.064	4.687	*P* < 0.01	0.139	Supported
H6:TI⇒ CRM	0.104	0.066	1.575	0.06	0.018	Not supported
H7:CC⇒ CRM	0.128	0.067	1.939	0.03	0.050	Supported
H8:PRG⇒ CRM	0.033	0.065	0.492	0.031	0.017	Not supported
H9:TD⇒ CRM	0.153	0.066	2.353	*P* < 0.01	0.077	Supported
H10:MU⇒ CRM	0.117	0.066	1 .772	0.04	0.063	Supported
H11:GD⇒ CRM	0.121	0.066	1.833	0.03	0.065	Supported

From the above-mentioned table, the following results are concluded:

- Clearly, a lack of communication significantly influenced CRM with a path coefficient value of 0.248, *T*-value of 3.875 at *P* < 0.01.
- Language difference also filled the above-mentioned criteria and had a significant impact on CRM with a path coefficient value of 0.144, *T*-value 2.215 at *P* is 0.01.
- In contrast, technology and policies, rules, and regulations did not significantly impact CRM, as they did not satisfy the criteria by having very low values, i.e., TI's *T*-value was 1.575 at *P* 0.06 with path coefficient 0.104. Similarly, PRG's *T*-value was 0.492 at *P* 0.031 with a path coefficient of 0.033, which is unacceptable.
- Delay in services also significantly impacted the endogenous construct with a *T*-value of 3.056 at *P* < 0.01 with a path coefficient of 0.199.

- The lack of experience and domain knowledge also met the above-mentioned criteria and significantly impacted CRM with the path coefficient value of 0.300, *T*-value 4.687 at $P < 0.02$.
- The lack of coordination and collaboration significantly impacted the endogenous construct with a path coefficient of 0.128, *T*-value 1.939 at *P* is 0.03.
- Time zone difference significantly impacted the endogenous construct by satisfying the given criteria with path coefficient value 0.153, *T*-value 2.353 at $P < 0.01$.
- The lack of mutual understanding significantly impacted the endogenous construct by satisfying the given criteria with a *T*-value of 1.772 at *P* is 0.04 with a path coefficient value of 0.117.
- The cultural difference significantly impacted CRM by satisfying the given criteria with a *T*-value of 1.712 at *P* is 0.04 with a path coefficient value of 0.113. From the above results, it is clear that H1, H2, H3, H4, H5, H7, H9, H10, and H11 were statistically significant, but H6 and H8 did not support the above-mentioned criteria and were not statistically significant.
- The endogenous construct, i.e., CRM values of R2 being 0.83, was statistically very significant. The value of R2 is acceptable if it is <=0.5 [58]. Six global fitness values calculated for the complete model evaluation using WrapPLS 6.0 show that if it satisfies the following measurements, the model is statistically significant.

  – *P*-values of APC, ARS, and AARS equal to or less than 0.05 are acceptable [48].
  – It is mentioned in [82] that the average adjusted R-squared (AARS) is generally less than the average adjusted R-squared (AARS).
  – Both average block VIF (AVIF) and average full colinearity VIF (AFVIF) are acceptable if they are less than or equal to 5 and ideally if they are equal to or less than 3.3 [83].

The hypothesis testing of the conceptual framework is shown in Figure 5. This research study followed the given measurements [86] by having *P* values of APC, ARC, and AARS less than 0.05. The value of AARS was 0.825, whereas the value of ARS was 0.834; both were attaining the recommended measurements [87].

Furthermore, AVIF and AFVIF were also calculated in this current study. As a result, AVIF and AFVIF introduced the latest dimensions that upgrade the assessment of the model's all-inclusive descriptive quality [88]. Based on the suggested measurements, this research study outcome verifies that AVIF and AFVIF satisfied the given criteria, as both values were less than 3.3. Furthermore, it demonstrates that both these values are ideally satisfied. Therefore, the evaluation of the structural model is also significant accordingly.

3.3. Comparison of SLR and Empirical Study

This section compares the SLR and empirical study of the current research. This comparison focuses on checking the similarity and variations between the two data sets. Figure 6 shows the comparison of factors from SLR and empirical study in graphical form.

The factors extracted from the SLR and the survey are shown in Table 9 along with their rankings. For identifying the factors affecting CRM in GSD, a closed-ended questionnaire process was used in this research study. The data collected from the questionnaire and the appearance of positive responses, such as strongly agree and agree, were selected.
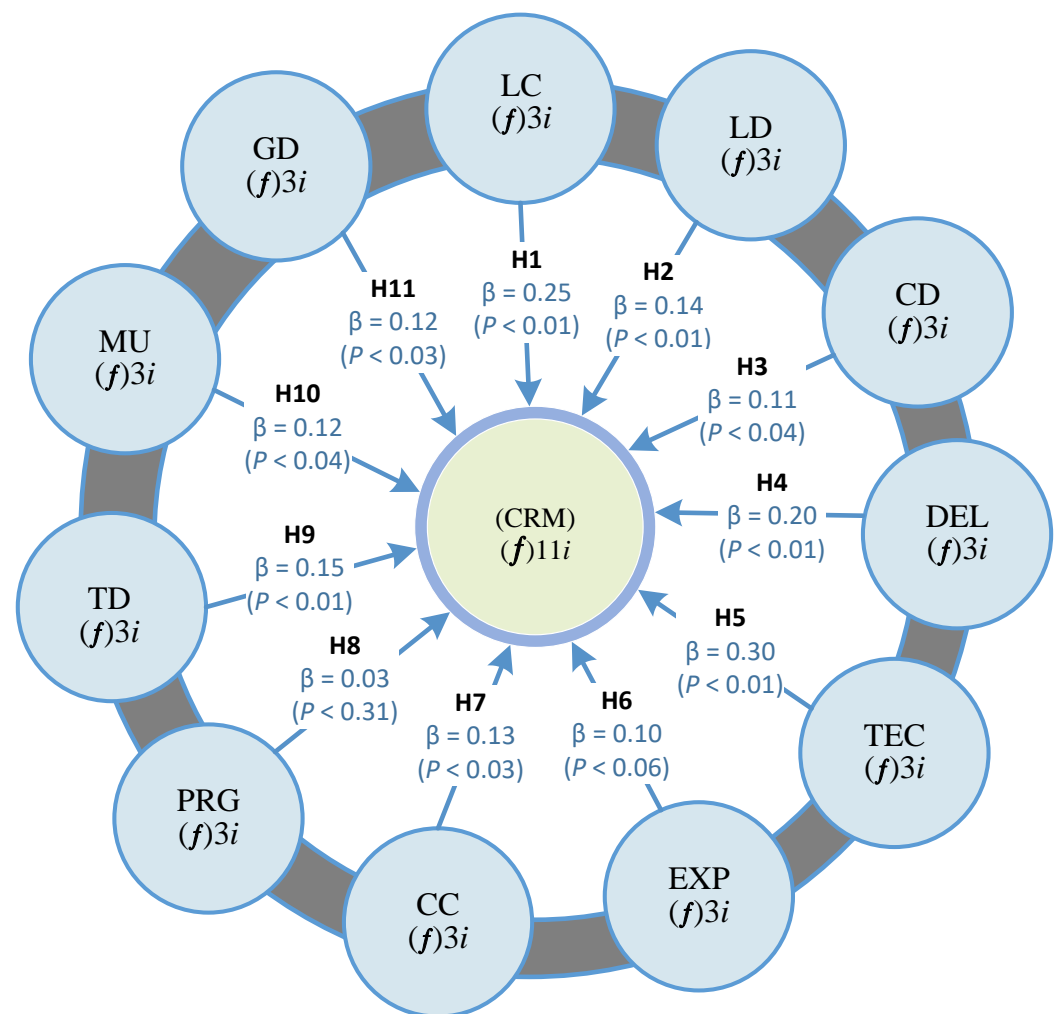
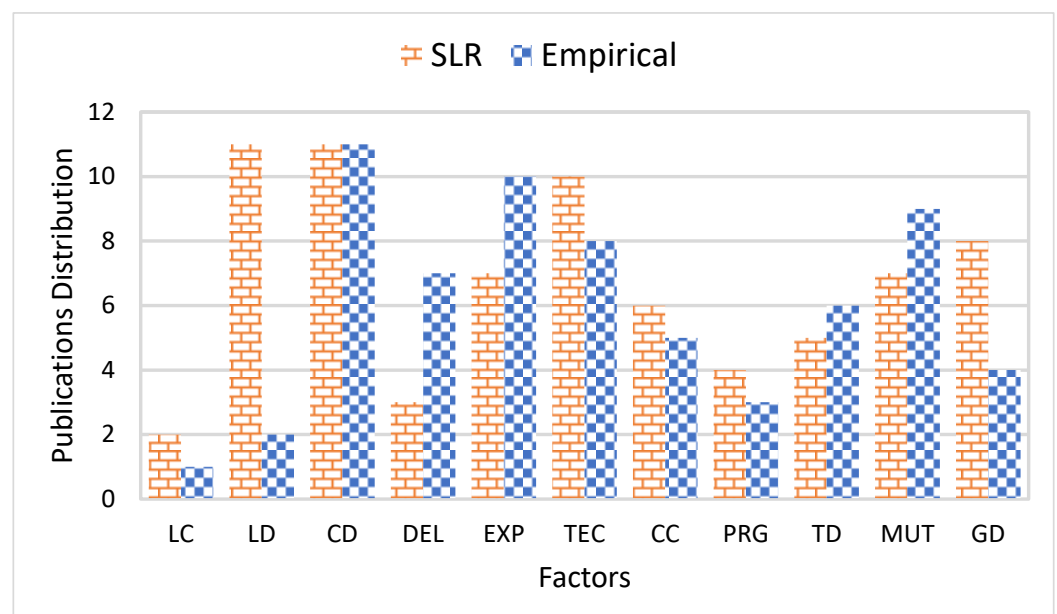**Figure 5.** A conceptual framework with hypothesis testing.

Figure 6. Comparison of SLR and empirical studies.

Table 9. Comparison of SLR and empirical study factors.

Factors	Survey%	Survey Rank	SLR%	SLR Rank
Lack of communication	74.7	2	75.5	1
Language difference	82.2	1	73.3	2
Culture difference	51.2	8	71.1	3
Delay in services	74.4	3	33.3	7
Lack of experience and domain knowledge	53.4	7	31.1	8
Technical issues	47.4	10	15.5	10
Lack of coordination and coordination	59.7	4	55.5	5
Policies, rules, and regulations	45.7	11	11.1	11
Time difference	57.5	5	53.3	6
Lack of mutual understandings	58.4	6	24.4	9
Geographical difference	47.8	9	68.8	4

Furthermore, Figure 7 presents a comparative analysis of SLR and empirical studies based on the extracted factors. For example, it is found that empirical studies based on language differences have a high percentage of 82.2% compared to other extracted factors. Similarly, it is found that the percentage ratio of the lack of communication in SLR studies is higher compared to that of other factors.
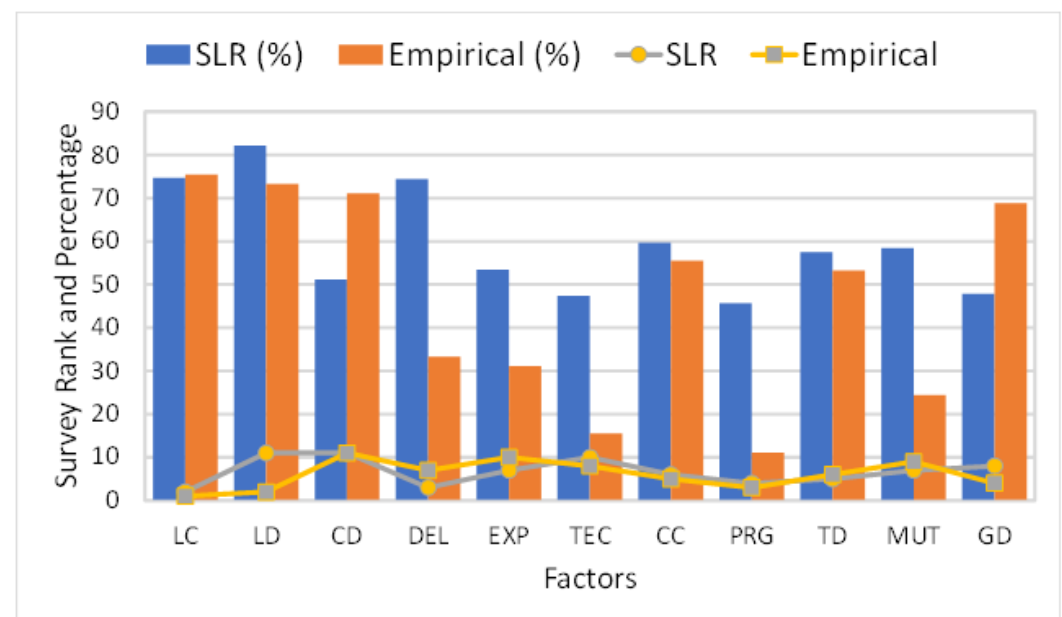
Figure 7. Comparative analysis of SLR and empirical studies factors.

To check the significant difference between the rankings of CRM factors identified in the SLR and the empirical study, Spearman's rank-order correlation was applied using SPSS [86]. The correlation value of Spearman's coefficient was 0.636, which shows the data collected from the SLR and survey were correlated. The *P*-value was found to be 0.004; it demonstrates that the correlation obtained by the rankings was statistically significant as suggested in [89]. Finally, Table 10 shows the correlation between SLR and empirical study.

Table 10. Rank-order correlation between SLR and empirical studies.

			SLR Ranking	Empirical Ranking
		Correlations		
			SLR Ranking	**Empirical Ranking**
Spearman Rho	**SLR Ranking**	Correlation coefficient	**1.000**	**0.636 ****
		Sig. (two-tailed)	**-**	**0.004**
	Empirical Ranking	Correlation coefficient	**0.636 ****	**1.000**
		Sig. (two-tailed)	**0.004**	**-**

** Correlation is significant at the 0.01 level (2-tailed).

The current research study compared SLR and empirical analysis to analyze the factors negatively affecting CRM in GSD. These factors may vary from organization to organization and be different due to geographical distance across various boundaries. To determine the critical elements, if the frequency of that factor is 50%, then it is believed as a crucial factor in both SLR and empirical study.

The outcomes of this study analyzed that three factors are extremely critical in both SLR and empirical studies, such as LD and LC. Furthermore, these findings help decide the most critical factors while working in GSD-based organizations. Therefore, these results are helpful to be aware of the practitioners performing GSD-based projects. Furthermore, these discoveries help to decide which influencing factor has the supreme influence and which factor does not much affect the CRM in GSD.

4. Discussion

The main objective of this research study was to reveal all the existing customer problems in GSD that reinforce CRM in GSD. A systematic-review-based analysis was carried out to identify the eleven critical factors and the effects of these critical factors were analyzed. A conceptual model was developed to define and illustrate the effects of CRM in the GSD environment. Different software organizations based in Pakistan were selected to obtain information concerning the factors affecting CRM implementation in GSD and negatively influencing their work environments. Previously many customer issues were discussed but not evaluated together. Moreover, their impact has not been analyzed. This research study highlights the impact of these identified issues and examines the effects of these issues on CRM implementation in GSD organizations.

A systematic literature review was performed to identify the factors that influence CRM implementation in GSD to address **RQ1**. As a result, eleven factors were identified from the selected 46 primary studies for the SLR mentioned in the literature that may affect the CRM in GSD. The identified eleven factors that negatively affect CRM in GSD include LC, LD, PRG, DEL, TEC, EXP, CC, CD, TD, MU, and GD. The conceptual model was presented to examine the influence of identified issues of CRM in a GSD context. A conceptual model and its hypothesis were empirically examined using quantitative analysis to answer **RQ2**. The proposed framework contains eleven factors, i.e., LC, LD, PRG, DEL, TEC, EXP, CC, CD, TD, MU, and GD, that affect the variables, i.e., CRM in GSD. The survey was conducted in Pakistan organizations based on GSD to appraise the impact of factors on CRM in GSD. This research study examines and assesses the effects of all factors mentioned in the literature.

This research empirically computes and assesses the influence of all the identified issues cited in the literature. The empirical study findings from the questionnaire survey prove that a lack of communication directly affects CRM in GSD and concludes that the increase in a lack of communication between customers and developers is one of the main reasons for the failure of CRM implementation. Similarly, based on our empirical study, other issues are language differences, a lack of experience and domain knowledge, delay in services, a lack of collaboration and coordination, culture differences, temporal differences, a lack of mutual understanding, and geographical distance. This demonstrates that the rela-

tionship between these issues and CRM is directly proportional. These nine factors directly affect CRM implementation and lead to project failure and increased customer satisfaction. Furthermore, the results of this research study also satisfy the hypotheses for the nine identified issues, which shows all these issues will directly impact CRM. In contrast, based on the results of this research study, technical issues and policies, rules, and regulations are not satisfying the hypothesis. Both have no direct effect on CRM failure while working in a GSD environment. Therefore, the results of this research study dispute the statement mentioned in the literature and state that technical issues and policies, rules, and regulations have no significant impact on CRM while working globally. This disagreement could be that as time passes, technical issues come up with opportunities to communicate with each other through the digital world rather than one-on-one. Similarly, with time, developers are becoming more experienced, learning new knowledge, and gaining more experience and knowledge about advanced projects. The hypothesis for policies, rules, and regulations was rejected in our case, as we know that organizations have policies and rules that favor the effective implementation process of CRM. Since respondents did not feel that this factor affects the CRM process, these policies and regulations usually favor customer support. The other possible cause may be the difference in the context, as the present study investigates the factors affecting the CRM process in software development companies. The other cause can be the intervention of government while drafting these policies, rules, and regulations.

Therefore, technical issues and policies, rules, and regulations have no significant impact on CRM; while working globally, as time passes, developers and organizations speed up and advancements are made, which reduces technical issues. Hence, it was concluded that all identified issues directly influence CRM in GSD. Therefore, organizations should pay attention to these issues to avoid project failure and satisfy customers. These findings are noteworthy for the organizations based on GSD to avoid the failure of projects because of customer dissatisfaction during the whole project. Furthermore, these findings are also beneficial, as they help focus on the critical issues that arise while associating with globally dispersed customers.

Spearman's correlation test was carried out (to answer **RQ3**) to compare the identified factors of SLR and empirical study. The rankings of the identified factors of CRM from both SLR and empirical studies have been found and analyzed through correlation analysis. Spearman's technique scrutinized the closeness and variations between the empirical study and SLR results. The result of this technique shows a significant correlation with each one. The satisfying criteria for the coefficient correlation value are in the range of +1 to -1 [76], and the value received by the coefficient correlation is 0.63, which is considered statistically significant, whereas $P = 0.004$, which is also acceptable if it is less than 0.01. Thus, through the output, it was decided that there is an acceptable correlation between the SLR results and empirical study. The factors discovered are noteworthy, as they determine how critical each factor is, thus increasing the risks of working with globally distributed customers impacting CRM in GSD.

This research study contributes to the empirical evaluation of eleven factors that vitally affect CRM in GSD. Moreover, the conceptual model and its hypothesis have evolved, which describes that these issues badly affect CRM in the GSD context. Therefore, the outcomes of the empirical investigations will be beneficial to control the customer's issues that affect CRM while working in a GSD context. Furthermore, it may lower the number of software project failures in Pakistan's software industries.

Significance of This Study

CRM systems are implemented to acquire, grow, and retain "right" customers. A successful CRM system implementation can help organizations to achieve customer loyalty and customer retention. The literature highlights the need for CRM and solving the issues of customers to increase business performance, strengthen competitiveness, and acquire routine success in a globally competitive environment. By applying CRM, organizations

can improve organizational performance and accomplish strategic goals in global business environments. Therefore, to the best of our knowledge, no potential research has been performed in the GSD context considering the client's perspective. There is also a lack of empirical studies investigating the potential factors affecting CRM implementation in GSD. Hence, it is imperative to analyze the barriers to CRM implementation in GSD to lower and overcome the challenges for successful CRM implementation in the GSD environment. It is the first-ever attempt to identify the conceptual model for the successful implementation of CRM in GSD. In addition, the studies in the literature reported several customer issues while communicating with organizations, such as time zone; language differences; the lack of experience, domain knowledge, coordination, and communication; and temporal and geographical differences. The proposed research study aims to address all these issues mentioned above faced by the customers through a well-planned strategy to enhance the CRM of the GSD-based organization. Thus, the proposed research study eventually results in customer retention and loyalty, thereby improving the potential financial benefits of an organization.

5. Conclusions and Future Work

Software houses and organizations utilize the GSD in the development of software projects and other activities to meet the quality demand of the global software market. Customer satisfaction is the dominant stakeholder in any software project's success, especially in the GSD environment. The scientific community has observed that customer issues and dissatisfaction are censorious issues and becoming more complex with the globalization of software organizations. One of the objectives of this research study is to reveal all the existing customer problems in GSD that reinforce CRM in GSD. This study recognizes and examines the factors that badly affect CRM implementation in the GSD environment. This research study uses a mixed methodology comprising SLR and empirical investigation. SLR has been performed to identify the factors that affect CRM implementation in the GSD context. After performing the SLR investigation, eleven factors were identified, and a conceptual framework based on these factors was empirically examined through an online questionnaire. Experiments were conducted to verify the hypothesis of the conceptual model for the data gathered from the software organizations based on the GSD environment in Pakistan. The results exhibit the factors affecting CRM in GSD that should be considered while executing software project development and processes in the GSD environment. The results are promising and accommodating to avoid any software project failure due to customer-related issues in a GSD environment.

This research concludes that customer satisfaction is an essential component to be considered for the success of software projects in any organization. In the development process, it is essential to coordinate with customers from the requirement phase to the end of the requirements. This research study assists the researchers and practitioners in the software development organization to better understand the customers' issues in the GSD environment. In addition, our research findings help to avoid and control these identified issues to ensure the project's success in the GSD environment. However, this study has certain limitations that should be considered for future research. Future research should investigate the issues influencing CRM from both customer and organizational perspectives in a single study to comprehend better and compare the major issues. Furthermore, the mitigation practices of CRM issues in GSD should be considered. This study is primarily quantitative in approach; in the future, we could consider both quantitative and qualitative approaches for the mitigation practices of CRM issues in the GSD environment. Moreover, a case-study-based approach could be adopted to understand the issues affecting CRM in GSD fully.

Appendix A

Table A1. Demographic and organization related information.

Section A—Demographic Information				
Email				
Gender			Male	Female
Education	Bachelor's degree	Master's degree	M.Phil. degree	Ph.D Other
Working experience in GSD	1–3 years	4–7 years	8–10 years	More than 10 years
Position	CRM manager	Team manager	Project manager	Developer
	Analyst	Other		
Section B—Organization-Related Information				
Nature of project	Software development	Web development	If other (please clarify)	
Number of employees	Between 10 and 25 employees	Between 26 and 50 employees	Between 51 and 80 employees	More than 80 employees

Table A2. Section C—Issues affecting CRM (customer relationship management) in GSD (global software development).

Lack of communication items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Less opportunities for synchronization affects CRM in GSD.	1	2	3	4	5
Ineffective communication with regard to requirements and specifications affects CRM.	1	2	3	4	5
Issues occur via telecommunication due to low bandwidth.	1	2	3	4	5
Language difference items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Semantic issues affect CRM in GS.D Poor language skills result in the delay of work.					
Language affects the understanding of client specifications.					
Policies, rules, and regulations items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Policies, rules, and regulations badly affect client satisfaction. Policies, rules, and regulations result in a change in user specifications. Policies, rules, and regulations do not allow customers much freedom to express their needs and desires that affect CRM.					

Table A2. *Cont.*

Delay in services items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Distributed teams cause a delay in services. Holidays always cause a delay in services. Disagreements between customers cause a delay in services.					
Technical issues items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Technical connectivity issues affect CRM. Technical resources directly influence on-time delivery, response rate, and customer satisfaction. Technical compatibilities in the GSD environment affect CRM.					
Experience and domain knowledge items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A lack of awareness about advance tools and software affects customers' needs. A lack of awareness of the project increases the time period of the project which affects CRM. Due to a lack of experience, developers are unable to understand the requirements.					
Lack of coordination and collaboration items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A lack of online coordination and collaboration increases the service cost of customers, affecting CRM. A lack of two-way communication channels can also affect CRM. Due to a lack of coordination, it becomes difficult to understand customer issues that affect CRM.					
Cultural differences items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Different working days (cultural festivals) affect CRM in GSD. Contextual differences directly influence CRM in GSD. Socioeconomic disparity affects CRM in GSD.					
Time zone differences items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Increased effort to initiate contact affects CRM. A lack of frequent feedback/responses affects CRM. Few hours overlapping affects CRM.					
Lack of mutual understanding items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Tacit knowledge (difficult to transfer knowledge to another) affects CRM. Communication issues impact mutual understandings. Misunderstandings increase project time duration which affects CRM.					
Geographical distance items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
No face-to-face meetings due to geographical distance. A lack of trust due to geographical distance affects CRM in GSD. Data transfer due to geographical distance causes data loss.					

Table A3. Section D—CRM in GSD (construct related in formation).

CRM Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A lack of communication directly affects CRM in GSD.	1	2	3	4	5
Language barriers directly influence CRM in GSD.	1	2	3	4	5
Policies, rules, and regulations directly influence CRM in GSD.	1	2	3	4	5
Delays in services directly influence CRM in GSD.	1	2	3	4	5
Technical issues directly affect CRM in GSD environments.	1	2	3	4	5
A lack of experience and domain knowledge directly affects CRM in a GSD context.	1	2	3	4	5
Collaboration and coordination issues negatively affect CRM in GSD.	1	2	3	4	5
Cultural differences negatively influence CRM in GSD.	1	2	3	4	5
Temporal differences influence CRM in GSD.	1	2	3	4	5
A lack of mutual understanding is a potential barrier to CRM implementation in GSD.	1	2	3	4	5
Geographical distance negatively influences CRM in GSD.	1	2	3	4	5

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