

Software as a Service based CRM Providers in the Cloud Computing: Challenges and Technical Issues

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ABSTRACT

In recent year, cloud computing as a new internet-based computing model provides different service providers dynamically. Today, Software-as-a-service (SaaS) is one of main key points of the computing procedure. However, by raising user interactions, the complexity of the cloud processes is increasing with the advancement of technology. Therefore, providing appropriate services to response the Customer Relationship Management (CRM) applications are challengeable in cloud environments. To the best of our knowledge, there is no any systematic and detailed review in the field of the SaaS based CRM providers in cloud computing. Therefore, this paper categorizes the SaaS features based on key points of the CRM providers. The SaaS features compared with each other according to important factors of the CRM providers such as business size, service deployment, ease of use, availability and efficiency. The advantages and disadvantages of each provider discussed as well as providing some hints for solving their problems.

KEYWORDS

SaaS, CRM Provider, Cloud Computing, Literature Review.

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1. INTRODUCTION

Cloud computing as an innovative internet-based computing platform (Hajizadeh and Jafari Navimipour 2017) offers pool of scalable and virtualized resources as a service such as SaaS (Cotroneo et al. 2016), PaaS (Kritikos et al. 2017) and IaaS (Jafari Navimipour et al. 2015). Cloud environment provides (Aznoli and Navimipour 2017; Chiregi and Navimipour 2016) the user's data and applications and stores them on the cloud servers (Chiregi and Navimipour 2017; Jafari Navimipour et al. 2015; Souri and Norouzi 2015; Van Thinh et al. 2016; Zhang et al. 2010). Some of the unique features of Cloud computing are availability, scalability, flexibility, service composition and fast services conformation (Kahlon et al. 2016; Navimipour and Vakili 2017; Xu et al. 2012). One of the important accomplishments of the SaaS providers (Milani and Navimipour 2016) is depend on the best possible outline and setup of its structural interaction versus users (Amiri 2016; Keshanchi et al. 2017; Souri and Navimipour 2014).

Customer relationship management (CRM) (Gholami et al. 2017; Krishna and Ravi 2016; Soltani and Navimipour 2016) is an innovation and incorporation procedure of business that should be facilitated to wipe out requirements of users and so that all of the system components must be measured deliberately and all the desires should be overseen (King 2008; Ghalenooie and Sarvestani 2016; Moshirpour et al. 2015; Rezaei et al. 2014). Not only every one of the organization branches such as marketing, accounting, producing and so on should focus on user and his needs and take an interest in sharing data (Chang 2016), but all the communicating with the user periods should be organized and a complete information about users should be valuable information among departments and individuals (Xu 2002; Ghalenooie and Sarvestani 2016). CRM applications can be serve as the software platforms in cloud environment. These applications support business process management and maintain the efficient interactions between business layer and online customers in cloud environment. The flexibility of CRM software has the effective interconnections between vendors and employees for large businesses in cloud. Finding an appropriate CRM provider as a service can help to match customer requirements and business process. Some review papers illustrated SaaS platform in cloud computing. For example, Tsai et al. (2014) presented a systematic review for SaaS challenges such as scalability, multi-tenancy method and redundancy. They

classified the SaaS approaches into four main categories that include service-oriented, PaaS-oriented, middleware-oriented and data-oriented (Aznoli and Navimipour 2017). The key weakness of this research is that the authors have not discussed the Service providers in cloud computing. Also, Benlian and Hess (2011) have presented an overview of SaaS opportunities and risks in information technology topic. They provided a comparison of Service providers based on application service provision for individual companies. The main defect of this research is that the authors have not illustrated the feature evaluation for the suggested providers. Finally, Mäkilä et al. (2010) have illustrated a categorization study on SaaS platforms that supports the business models for web-based solutions, high SaaS characteristics and pure SaaS in cloud environments. This study is very briefly and limited to Finland.

To the best of our knowledge, a systematic and detailed survey is not discussed for the SaaS providers of CRM in the cloud computing. This paper presents a systematic survey on the new recent SaaS providers in CRM. The contributions of this paper are as follows:

- Providing a summary of the current challenges related to the SaaS-based CRM providers in cloud environment.
- Presenting a categorized overview of the current SaaS-based CRM providers and additional significant achievement in this area.
- Exploring a structure of the important methods that are significant in the SaaS-based of the CRM providers.
- Discussing the important factors of classification the CRM features in the SaaS providers.

The remainders of this paper will proceed as follows: section 2 illustrates SaaS features in CRM process. This section categorizes existing features into three main features that include structural features, user-based ease features and CRM efficiency features. Section 3 demonstrates new and top ten CRM providers as a service in cloud computing. Also, this section explain these providers in SaaS platform. Section 4 presents a comparison of the SaaS providers for selected CRM features. Also, this section shows a discussion gap on challenges and some open issues in this field. Finally, Section 5 contain conclusions of this research and upcoming studies.

2. SAAS FEATURES IN CRM

This section illustrates some key features for evaluating the SaaS providers in CRM cloud that are divided to three classes (Ali et al. 2016): structural features, user-based ease features and CRM efficiency features. Figure 1 illustrates a taxonomy of SaaS features in the CRM (Dowsley et al. 2016). In the structural features, five main attributes include service deployment, service categories, business size, pricing tier and mobile compatibility. In addition, user-based ease features have three main attributes that include ease of use, ease of setup and quality of support. Finally, the effectiveness features contains efficiency, data availability (Chen et al. 2017), responsibility, collaboration and data security (Alireza Souri et al. 2016).

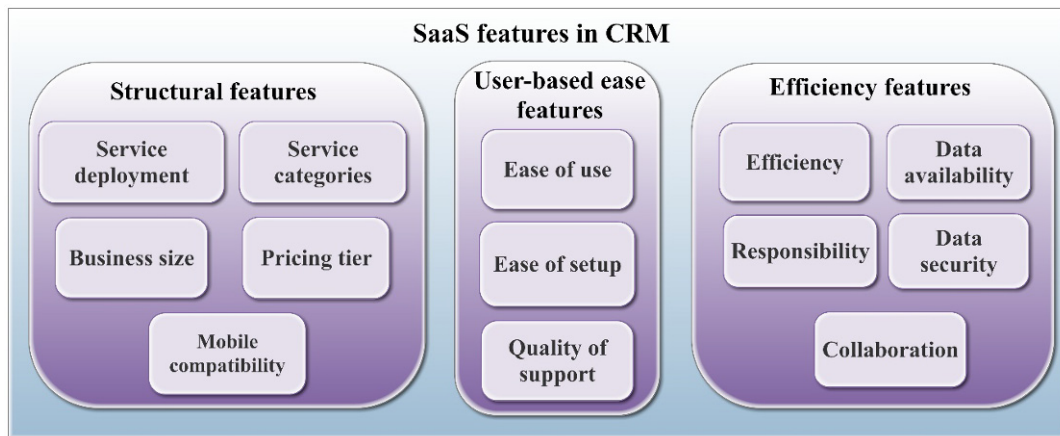


Figure 1. The Taxonomy of SaaS Features in CRM Providers

We represent the three main classes as follows:

2.1 Structural Features

The structural features of a CRM provider include service deployment, service categories, business size, pricing tier and mobile compatibility (Gordon 2017; Vukovic et al. 2016).

1. SaaS deployment is a key feature in first step of the provider selection.

- Cloud-based deployment is commonly respected in light of a membership principle controlled by the quantity of customers. In this deployment, software is transported in a web browser.
- On-premise deployment is achieved to buy a continuous license truthful as login

subscription. In this deployment, subscribed software is placed on the servers of owner software.

2. SaaS categories are classified into two main side that include enterprise and small and midsize business (SMB). Enterprise is a service presentation for large and very large businesses and productions in more than 500 users. In the enterprise category we discover the correct key explanations to transform CRM communications. Because of the business size of SMB category, it has different necessities and challenges than enterprise category.
3. Business size is divided in to three class that include small-sized, medium-sized and large-sized business plans.
4. Pricing tier is the final cost of the service that user should be paid. This feature is divided to three main classes that include expensive or high, appropriate or average and affordable or low.
5. Mobile compatibility is the platform session to support service execution on mobile devices. This feature is organized in three main platform that include Android, IOS and Windows phone.

2.2 User-Based Ease Features

The user-based ease features of the CRM provider include ease of use, ease of setup and quality of support which customers dedicate some scores to the used providers (Vidhyalakshmi and Kumar 2017).

1. Ease of use is the user-friendly conditions between application and costumer such as the compatible user interface, simple forms, conceptual navigations and routine interactions. The ease of use feature is achieved simplicity, consistency and performance of a user interaction with service.
2. Ease of setup is the setup process with a package installation that user can install a software with on click trigger. Independence of the software to special devices and platforms for installing is an ease of setup factor. In ease of setup, time spent of the setup is very fast and without wasting time.
3. Quality of support is the after-sale services that costumer use some guarantee services

such as online trouble shooting, online responsible service, covering run-time faults and technical errors (Ye et al. 2016).

2.3 Efficiency Features

The CRM productivity features are separated into five important factors that include efficiency, data availability, responsibility, collaboration and data security. We present these benefit features for CRM services as follows:

1. **Efficiency.** A suitable CRM software is defined as a good product by notice to the using existing resources in the business environment by minimum time and energy consumption. This suitable software is efficient for the current business environment.
2. **Data Availability.** Availability as a greatest tactical and instrumental benefit is one of the main factors in Data integrity for the CRM software. When a failure is occurred, the data should be available for user requirements.
3. **Responsibility.** Responsibility as an interactive connection between CRM service and customer that specifies customer communication trustworthy and responsible. This feature helps understanding on-demand customer relationships in a business process.
4. **Collaboration.** Customers have a collaborative procedure by accepting partner e-contract in sharing information in the business process. If the collaboration between customer and business is high, then the trust and cooperation are increased.
5. **Data Security.** In the CRM software, provider receives some critical and sensitive information. Data security is a main challenge for maintaining secure information by CRM providers. The users can trust to the provider that has the secure conditions for analyzing and maintaining data and information.

After a brief description of some important features of the SaaS providers in CRM cloud, we explain the CRM providers in the next section.

3. CRM PROVIDERS AS A SERVICE

In this section, we choose top ten famous CRM services for reviewing presented features in cloud computing.

1. Salesforce.com is a cloud CRM innovator as the largest CRM provider company in the marketing environments that navigates cloud merchants using the SaaS model. The sufficient superiorities of this provider include more prominent proficiency for different groups, enhanced analytical information and reporting, mechanization of daily tasks. The application solution is not accessible for utilizing in on-premise deployment.
2. Oracle as the experienced company (initiated in 1997) is the first CRM as a service provider to implant modern promoting and lead administration automation, including presentation pages, advanced following, lead scoring, dynamic profiling, sustain crusades and appropriation of offers prepared leads. Battle computerization licenses advertisers to plan different channel, lights-out crusades utilizing a visual business prepare configuration apparatus. The main defects of this provider are as follows: the user experience and interface does not contend positively with SaaS; some convinced functions (i.e. Email Marketing) are supported just the internet explorer browser; there is no any email synchronization by Gmail service.
3. NetSuite as the easy to use service provider has a variability of cooperative structures. The benefits of this provider include facilitate to reach the sales aims, generate effective marketing operations, and offering outstanding client service to customers. There are some defects in this provider that include the interaction and management weakness in offline version; there is no any email synchronization.
4. Microsoft Dynamics CRM as the hybrid conveyance is the exclusive service provider that supports both on-premise and cloud deployments. The main benefit of this provider is that it can provide the flexibility to customer choices in terms of the suitable data center based on the appropriate cost, vicinity, idleness and service level agreement. The main disadvantages of this provider are as follows: it has is not an offline or synchronous abilities; in the mobile devices, it has not support the JavaScript.
5. Infusionsoft is a qualified service provider that incorporates deals and promoting, contact administration, and internet business capacities. Nonetheless, it is harder to use than different items in the CRM provider audit, and the costumer needs to invest energy and cash on an underlying preparing project.
6. HubSpot is a cloud-based provider that deals application intended to construct, and

precipitate the business procedure. The arrangement enables deals staff to interface with promising leads and change over them into fruitful arrangements. This provider permits computerizing business correspondence by characterizing a grouping of customized follow-up messages and updates. With the continuous engagement refreshes, clients get notice when the client opens an email or tap on a campaign interface.

7. Sugar CRM as the open source CRM provider has a portable unit for industrial vendors and the cost effective in the marketing. This provider has a flexible customization in the CRM industry by supporting the large business models. The defects of this provider are as follows: weak competitive environment on on-demand service, unappropriated for small businesses.
8. Zoho CRM provider enables little to vast estimated associations with a total client relationship lifecycle administration answer for overseeing association wide auctions, advertising, and user support and inventory supervision in a solitary business framework. The Zoho vision is hazy, and the business applications heading is considerably more dubious.
9. Pipeline Deals enables clients to deal with their contacts, qualify leads, and track leads and arrangements inside a particular, cloud-based program. The framework gives both deals engagement and CRM while giving every day pipeline previews, continuous arrangement announcements and 3D outlines on a thorough deals dashboard. In this provider, clients access pages that contain all exercises, individuals, archives and occasions identified with a solitary arrangement.
10. Maximizer CRM is an adaptable to help the contacts adequately. Its advertising and deals components are a portion of the best that we looked into, however this program doesn't offer stock or representative administration.

After a brief description of some famous SaaS providers of CRM, the important features of each CRM product are explain in the next subsection.

4. DISCUSSION

This section presents a technical comparison of selected SaaS providers and illustrated

features in CRM services. The comparison analysis of the SaaS providers is based on the presented CRM features that are divided into three main classes. Also, a brief discussion is presented to evaluate the SaaS providers in CRM. Finally, some related open issues on SaaS providers of the CRM in cloud computing are considered.

For each feature class, we present a comparison analysis for evaluating the existing SaaS providers. With respect to technical review websites such as Top-CRM¹, Software Advice², Capterra³ and G2crowd⁴ that leverage more than 170,000 autonomous and authentic customer reviews as the technical review platforms, the following information are expanded and collected from the above platforms. Table 1 shows the comparison of the SaaS providers with respect to structural features in CRM that include deployment strategy, service category, business size, pricing tier and mobile compatibility. In this table, just two providers Microsoft Dynamics and Maximizer support both on-premise and cloud deployment strategies. Also, the Infusion-soft and Maximizer providers support only small size business process.

Table 1. Comparison of the SaaS Providers with Structural Features

| No. | Provider | Deployment | Category | Business size | Pricing Tier | Mobile compatibility |
|-----|--------------------|------------------|------------|---------------|--------------|----------------------|
| 1 | Salesforce | Cloud | Enterprise | S/M/L | High-end | IOS/And/Win |
| 2 | Oracle | Cloud | Enterprise | S/M/L | High-end | IOS/And/Win |
| 3 | Netsuite | Cloud | Enterprise | S/M | High-end | IOS/And/Win |
| 4 | Microsoft Dynamics | On premise/Cloud | Enterprise | S/M/L | High-end | IOS/And/Win |
| 5 | Infusionsoft | Cloud | SMB | S | Average | IOS/And |
| 6 | Hub Spot | Cloud | SMB | S/M | Average | IOS/And |
| 7 | Sugar | Cloud | SMB | S/M/L | Average | IOS/And/Win |
| 8 | Zoho | Cloud | SMB | S/M/L | Low-end | IOS/And/Win |
| 9 | PipelineDeals | Cloud | SMB | S/M | Low-end | IOS/And |
| 10 | Maximizer | On premise/Cloud | SMB | S | Low-end | IOS/And |

Table 2 shows the comparison of the SaaS providers with respect to user-based ease features

¹ www.top-crm.com.

² www.softwareadvice.com.

³ www.capterra.com.

⁴ <https://www.g2crowd.com>.

in CRM that include ease of use, ease of setup and quality of support. In this table, the allocated rate of each provider is calculated based-on user scores (1-10). By comparing the average of the feature scores, the Salesforce provider has highest ease score in the CRM providers.

Table 2. Comparison of SaaS Providers with Ease Factors

| Nom. | Provider | Ease of Use | Ease of Setup | Quality of Support |
|------|---------------|-------------|---------------|--------------------|
| 1 | Salesforce | 9/10 | 9.5/10 | 8.8/10 |
| 2 | Oracle | 7.1/10 | 6.3/10 | 6.9/10 |
| 3 | Netsuite | 5.7/10 | 5.4/10 | 6.1/10 |
| 4 | Microsoft | 6.8/10 | 6.2/10 | 7/10 |
| 5 | Infusionsoft | 7.5/10 | 8.8/10 | 6.2/10 |
| 6 | HubSpot | 9/10 | 8.9/10 | 8.9/10 |
| 7 | Sugar | 7.3/10 | 6.8/10 | 7.5/10 |
| 8 | Zoho | 8.9/10 | 9.1/10 | 8.6/10 |
| 9 | PipelineDeals | 9/10 | 8.9/10 | 9.2/10 |
| 10 | Maximizer | 8.3/10 | 7.8/10 | 8.5/10 |

Table 3 illustrates the comparison of the SaaS providers with respect to efficiency features in CRM that include efficiency, data availability, and responsibility, collaboration and data security. In this table, each feature is specified with *high*, *moderate* and *low* values.

Table 3. Comparison of SaaS Providers in CRM Efficiency Factors

| Nom | Provider | Efficiency | Data Availability | Responsibility | Collaboration | Data security |
|-----|---------------|------------|-------------------|----------------|---------------|---------------|
| 1 | Salesforce | High | High | Moderate | High | Moderate |
| 2 | Oracle | High | High | Moderate | Low | High |
| 3 | Netsuite | High | Moderate | High | Moderate | Moderate |
| 4 | Microsoft | High | Moderate | Moderate | Moderate | Moderate |
| 5 | Infusionsoft | Moderate | Low | Moderate | Moderate | Moderate |
| 6 | HubSpot | High | Moderate | Low | Low | High |
| 7 | Sugar | High | Moderate | Moderate | Moderate | Low |
| 8 | Zoho | High | Moderate | Low | moderate | Low |
| 9 | PipelineDeals | High | High | Low | Moderate | Low |
| 10 | Maximizer | Moderate | Moderate | Low | Moderate | Moderate |

There are some twice details to improve the structural, user-based and efficiency features of the CRM provider. These details maybe growth in contrast them. A balance line can continue the evolution of the CRM provider features by growing both details. We discuss the twice details as follow:

Scalability and Stability (S&S) are two compatible factors for promoting the structural features of the CRM providers. There are some ways for improving the S&S factors in the SaaS providers of the CRM. For example, using the enhanced hardware configurations to present the CRM providers that include higher bandwidth, powerful data centers and more storage spaces. Also, providing a consistence interaction for the customer and the CRM provider can influence on the S&S factors. By balancing the S&S factors, the CRM providers can increase more structural features in the customer interactions. For assessing the S&S, we mapped the structural features as measurement of the scalability condition and data availability and efficiency factors as measurement of the stability condition after normalizing them. Each factor of the structural features has a range 1, 2 and 3 scores. By averaging the scores feature of each provider the scalability value of it is specified. For example, the scalability value of the *Salesforce* provider is calculated as follows according to Table 4:

Table 4. Evaluating Scalability Value for *Salesforce* Provider According to Structural Features' Scores

| Deployment | Category | Business size | Pricing Tier | Mobile compatibility | Total score (Scalability) |
|--|---|--|---|---|----------------------------------|
| <ul style="list-style-type: none"> • On premise/ Cloud (3score) • Cloud (1score) | <ul style="list-style-type: none"> • Enterprise (3score) • SMB (1score) | <ul style="list-style-type: none"> • S/M/L (3score) • S/M (2score) • S (1score) | <ul style="list-style-type: none"> • High-end (3score) • Average (2score) • Low-end (1score) | <ul style="list-style-type: none"> • IOS/And/Wi n (3score) • IOS/And (2score) • And (1score) | <i>Salesforce</i> |
| 1 | 3 | 3 | 3 | 3 | 13/15 |

Also, the stability value is measured according to Table 5 for *Salesforce* provider as an instance.

Table 5. Evaluating Stability Value for *Salesforce* Provider According to Availability and Efficiency Scores

| Data availability • High (3score) • Moderate (2score) • Low (1score) | Efficiency • High (3score) • Moderate (2score) • Low (1score) | Total score (Stability) <i>Salesforce</i> |
|--|---|--|
| 3 | 3 | 6/6 |

Responsibility and Redundancy (R&R) specify the effectiveness of the user-based ease features for the CRM providers. Using high-speed networks, substantial load balancers and APIs for indexing and searching user reports and finding best response to deliver the users. The R&R factors have a reverse relationship with together that means if the responsibility of a provider is increased then perhaps the redundancy factor is not growth and vice versa. For evaluating the R&R, we mapped the ease factors as measurement of the responsibility condition and the collaboration and data security factors as measurement of the redundancy condition after normalizing them. Each factor of the ease features has a range 1, 2 and 3 scores. By averaging the scores feature of each provider the Responsibility value of it is specified. The responsibility and redundancy values are calculated similar S&S values.

After specifying all of the S&S values, we normalize two values according to normalization method in range (0-10). The H is 10 as the high bound and the L is 0 as low bound. The a_{max} and a_{min} are the maximum and minimum values of each value and a is the scalability or stability value. The V is the normalized value.

$$V = L + \frac{(a - a_{min})(H - L)}{a_{max} - a_{min}} \quad (1)$$

Figure 2 illustrates a correlation diagram for the S&S factors based on the existing CRM providers. If a CRM provider is shown on the balance line, the S&S factors of this provider increase together that means the structural features of this provider is improved in all of the dimensions. For example, *Microsoft drive*, *Oracle*, *Netsuite* and *Salesforce* providers have best performance on the structural features according to the balance line.

Figure 3 depicts the correlation diagram for the R&R factors based on the existing CRM providers. If a CRM provider is shown on the balance line, the user-based ease features of this provider is improved in all of the dimensions. For example, *Maximizer*, *HubSpot*, *Infusionsoft* and *Salesforce* providers have best performance on the user-based ease features according to the balance line.

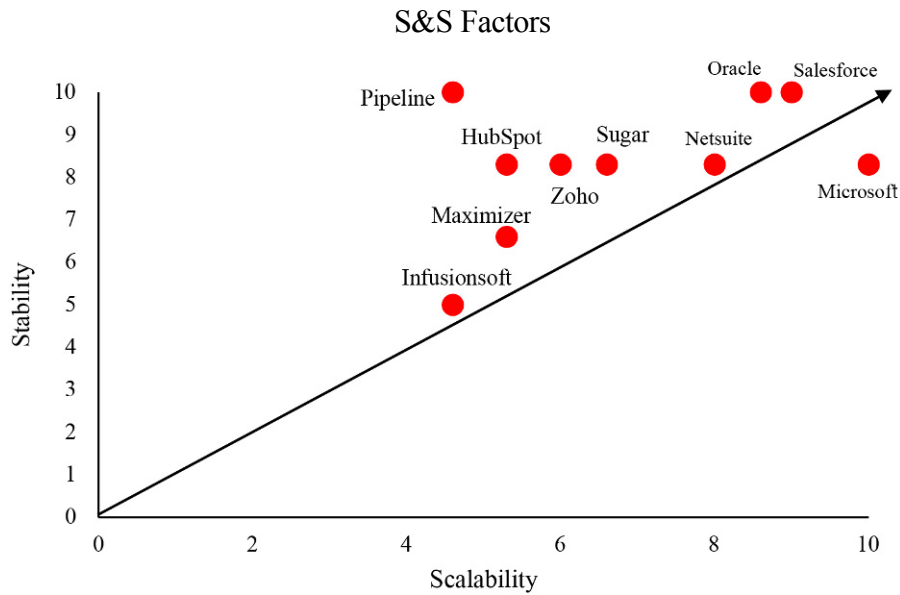


Figure 2. The S&S Correlation Diagram of CRM Providers

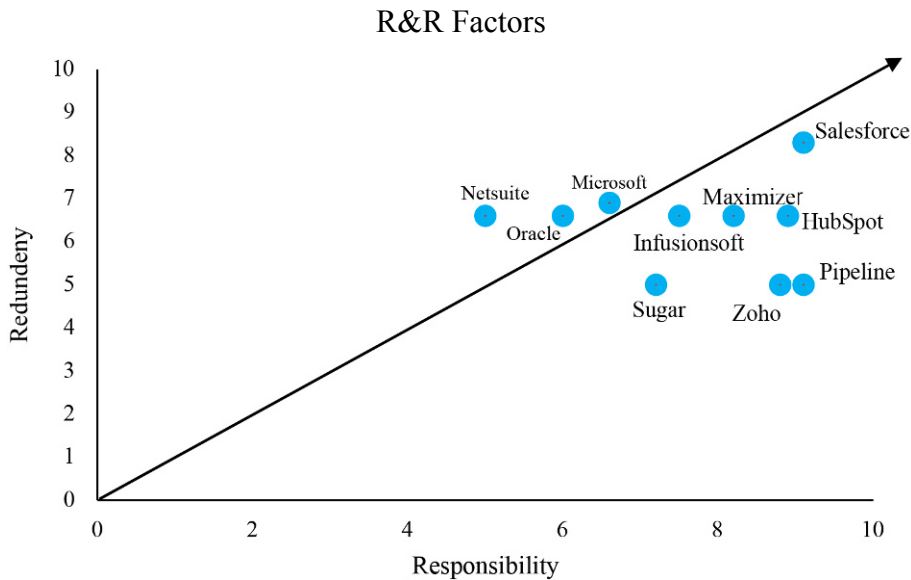


Figure 3. The R&R Correlation Diagram of CRM Providers

In addition, some related open issues on SaaS providers of the CRM in cloud computing are considered as follows:

Non-functional properties. Describing and analyzing non-functional properties are challengeable such as reliability, scalability, security, interoperability and quality of service. Simulation and statistical testing the actual and methodological scenarios can evaluate the non-functional properties between the SaaS providers and the customer interactions. Also, data mining approaches can effect on learning the unknown patterns for increasing the CRM features as a challengeable topic.

Functional properties. Formal verification of the interactive platforms such as the CRM providers is an important measurement to evaluate the functional properties such as deadlock conditions, reachability, consistency and safety properties. The functional properties are specified in the behavioral interactions between the behavioral CRM features and the system structure of the SaaS providers.

Service performance and complexity. Regularly, some service performance factors such as service presentation, accounting, service delivery, service sale and service management effects on the gathering of data and allocation of information in a CRM provider. Having a routine workflow with low complexity can increase the customer satisfaction in providing the CRM services with high quality, revenue and profit retention. Finding the efficient workflow is one of the main challenges of the SaaS providers in CRM policies.

5. CONCLUSION

By increasing service interaction in cloud environments, SaaS providers have a significant influence on the CRM architectures. In addition, SaaS providers help manipulation of the CRM mechanisms in the business process. In this paper, a new perspective of SaaS providers presented for responsibility of the CRM platforms in cloud environments. Specially, this paper provided a systematic overview for showing some important challenges and technical issues of the CRM as service providers. First, a categorized taxonomy for the SaaS features of the CRM is presented. Then, the important factors of the CRM features in the SaaS providers had divided to three main categories in forms of structural features, user-based ease features and CRM efficiency features. For evaluating the SaaS features of the CRM, top ten

of the famous SaaS providers are selected to analyze and compare the important challenges and weaknesses. Also, some important S&S and R&R factors are compared for existing providers. The comparison results shown that *Microsoft Dynamics*, *Oracle*, *Netsuite* and *Salesforce* providers have best performance on the structural features. Also, just two providers *Microsoft Dynamics* and *Maximizer* support both on-premise and cloud deployment strategies. Also, the *Maximizer*, *HubSpot*, *Infusionsoft* and *Salesforce* providers have best performance on the user-based ease features. Finally, some related open issues on the SaaS providers of the CRM in cloud computing provided such as non-functional properties, functional properties, service performance and complexity. In the future work, we will try that present a systematic technique to assess the SaaS features quality of the CRM in the high interactive platforms with fault tolerant factor such as hybrid clouds environments.

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