

A CASE STUDY FOR THE CRM SOFTWARE SELECTION PROCESS IN A TRANSPORTATION COMPANY USING AN INTEGRATED AHP AND QFD APPROACH

Case
Study

Keywords

QFD and AHP;
Quality function deployment;
Software evaluation;
IT support;
Decision making;
Integrated MCDM;

Abstract

Various CRM software programmes have been introduced by big companies to create reliable solutions to provide the best service for customers and to receive customer feedback which helps to develop the company's products. However, one of the hardest decisions for a company is choosing the best software that fits its needs. In modern customer relationship management, the software candidates for CRM ticketing systems are evaluated based on multiple criteria rather than only considering the cost factor. This article will adopt an integrated MCDM model, a combined AHP "Analytic Hierarchy Process" with the QFD method. Sixteen technical parameters and fifteen customer support department requirements were collected, analyzed, evaluated, and then ranked using this model. This reliable model considers the stakeholders when making decisions, and measures their decision consistency in order to choose the best CRM software. This research analyzes a sample of the CRM software technical parameters used in a case study conducted on a transportation-rental company focused on its IT customer support department requirements.

INTRODUCTION

Enterprise Resource Planning (ERP) has an essential role in multiple modern businesses with its ability to integrate finance, the flow of material, and knowledge to improve organizational strategies (Yusuf, Gunasekaran, & Athorpe, 2004).

Although the selection process is slow and takes time, given the significant financial investment and possible risks and benefits, it is impossible to overemphasize how crucial it is to adopt an appropriate methodology when selecting an ERP system (Teltumbde, 2000). Soh, Kien, and Tay-Yap (2000) discussed issues facing organizations when rushing to find quick solutions and using simple decision-making methods, such as pairwise comparison, which cannot solve problems due to the complexity of the ERP system. It is important to find the balance between changing the organization processes to fit the software used and customizing the software to fit the processes. They also explained how a misfit analysis used at the beginning of the process can save effort and money, and also emphasized the importance of obtaining detailed knowledge of this complicated software and a comprehensive understanding of the organizational processes.

CRM software includes these elements of the ERP system: accounting, business intelligence, inventory management, and customer relations management (CRM), excluding the manufacturing and human resources sections. Therefore, the author has adapted some of the ERP selection methods' in CRM software selection.

This research is a Case Study Design research. It is considered a part two application of the author's previous article "Improving ERP software selection process by integrating QFD with AHP approach". This integrated method has been tested on multiple fields, including the suppliers' selection process in supply chain management (Dai & Blackhurst, 2012), strategic marketing (Lu, Madu, Kuei, & Winokur, 1994) and in the robot selection process (Bhattacharya, Sarkar, & Mukherjee, 2005). However, this is the first time it has been tested here on a CRM or ERP software selection.

The central hypothesis in this research is that the currently used software in the selected company does not offer the best customer service according to the selected department's requirements. The subject of the examination is the company's IT department, which intends to adopt an ERP or CRM system with a minimum change to existing processes. This study aims to measure the effectiveness of the currently used CRM software – Zendesk - and compare it with other competitors in order to choose the best CRM software. It also illustrates the factors used to measure the efficiency of CRM software. This research will firstly present the functionality ERP systems, and then focus on

the CRM element of the ERP to obtain a better understanding of software used.

ENTERPRISE RESOURCE PLANNING (ERP)

Researchers have referred to ERP systems by different names and definitions, such as integrated vendor software or enterprise systems; however, these definitions are not significantly different.

Currently, there are different software implementations of ERP systems. Somers and Nelson (2001) introduced a four tier classification regarding an ERP system's functionality and its high or low level of flexibility. Figure 1 illustrates ERP systems classified into the four tiers.

When it comes to the ERP system's implementation process, Al-Mashari, Al-Mudimigh and Zairi (2003) defined it in six steps (phases): initiation, adoption, adaptation, acceptance, routinization, and infusion. Companies may select different implementation approaches depending on their demands. A study by Deloitte & Touche Consulting divides an organization's motivation for ERP implementation into two categories: technological and operational (Al-Mashari et al., 2003).

Technological motivation aims to replace the diverse systems to improve the quality and the visibility of information, the business processes, systems integration, and the ease of business acquisition integration into the existing technology infrastructure.

On the other hand, operational motivation is connected to improving poor business performance, lowering high-cost structures, improving customer relations, improving business processes, making complex processes simple and standardizing business processes in a company (Al-Mashari et al., 2003; Galin, 2011).

The functionality of ERP systems

To understand the ERP system and its main functional areas, this research will present them all and focus on the CRM element of the ERP. The ERP system includes essential data and analytical tools; the most frequently used ones, according to Galin (2011), are the following:

- **Financial area:** This involves maintaining the predictability of business performance and guarantee compliance; therefore, the enterprise can gain a comprehensive financial insight across the company and tighten the management of finances. It automatizes financial and accounting management along with the supply chain management financial structure. The model presented does not focus on this section of the ERP system.

- **Human Capital Management:** This vital function of ERP works to optimize human

resources (HR) processes, ensuring their integration by considering the global human capital solution management. Using this function, organizations can manage the workforce while supporting innovation, growth and flexibility. They can automatize the core HR processes, talent acquisition, and workforce deployment, which will enforce higher efficiency and better flexibility and adhere to globally and locally changing rules.

- **Operations:** This involves managing final product procurement and its logistics-related processes to ensure the business cycle is completed, along with bills of materials, order management, capacity planning, management, shop floor control, demand and forecasting, the cost of the product, and all product-related operations.

- **Corporate Services:** Provides support and coordination of global trade services and administrative processes in the areas of real estate, and company environments such as health, safety, and travel compliance.

- **Customer Relations Management:** Organizes the contact points with customers, establishing reliable connection channels that ensure customer satisfaction, obtaining real-time feedback and support, and providing product training and assistance. It allows the company to deal with possible product failures and escalate it to the related department if necessary and keep the customer in the loop for every update and change.

- **Others:** Other functions of ERP software include product configuration and design, quality management, reporting tools, maintenance and scheduling management, and supply chain management.

Critical Success Factors in ERP

ERP implementation is a delicate process that requires stakeholder cooperation to be successful. Companies may face problems in or after the implementation phase, considering the ongoing change in customer requirements; therefore, process updates are necessary to solve new challenges.

This section emphasizes the importance of the implementation process, which is no less than the selection process; many companies avoid spending on planning for implementation or training, which raises many future problems, such as those faced by the company selected here.

Although a company selects the best software that meets its requirements, it is still not enough on its own to overcome the challenges facing the company.

Payment problems in the selected company can be solved by selecting better CRM software that has better control of customer contacts, or by adjusting their processes and reassessing what needs to be changed to overcome this problem. In both approaches, successful implementation is required.

Many researchers have listed the critical factors for successful ERP implementation which may affect the implementation process and can help in solving problems occurring in the organization (Galín, 2011).

Al-Mashari et al. (2003) recommended having a clear vision and a business director, both of which are vital for successful ERP system implementation.

According to Gupta (2000), the keys to a successful implementation of ERP are the following:

- Ensure the commitment and full involvement of top management.
- Ensure the task team includes all possible stakeholders in functional areas.
- Search and assess the hardware required for the implementation.
- Move step-by-step throughout the implementation, which is better than doing everything at once.
- Plan before starting and provide all the training required for users.
- Organize the decision-making process to ensure rapid implementation without interruption.
- Since ERP implementation may last a long time, patience is required from all involved.

Umble, Haft, and Umble (2003) summarized the most distinguished critical success factors, which are the following:

- The strategic goals of the company are defined and clearly understood.
- The top management is committed to the implementation project.
- The company has project managers with long experience and skills.
- The concepts of change and improvement exist and are managed by the organization.
- The company has a highly motivated implementation team with good experience.
- The team has accurately gathered the required information and data.
- The company provides professional and comprehensive training.
- The company measures the performances at each stage.

Customer Relations Management (CRM)

The ERP System is a combination of software packages used by enterprises to manage everyday business processes. Furthermore, CRM is an essential functional element of an ERP system; some vendors provide CRM software separately with some other selected functions of ERP.

Companies that successfully implement CRM will harvest many rewards in customer loyalty and long-run profitability. Managing a successful CRM implementation requires an integrated and balanced approach to manage technology, process, and people.

This integration throughout the context of an integrated cross-functional organization, centralized customer processes, enterprise-wide strategy, and followed by technology-driven business processes, is shown in Figure 2.

By enhancing product support for customers, competitiveness is enhanced. It is all about seeking to understand what customers want by integrating departments by focusing on retaining customers and developing the relationship with them. CRM applications help organizations estimate customer loyalty and profitability support by monitoring key indicators such as repeated purchases, in order to understand the demand, along with customer satisfaction, and also provide real-time technical support for products. Given the importance of this, software companies such as PeopleSoft, SAP, Oracle, Clarify, SAS, and Siebel are racing to provide reliable CRM applications for organizations (Injazz J et al, 2003).

AMR Research estimated that the CRM market would top \$16.8 billion by 2003 (Chen & Popovich, 2003). Subsequently, a report in 2017 by Albert, Misho, and Aleksandra (2019) showed that the CRMs software market share had reached that figure, and exceeded it, and stood at \$27.2 billion. Figure 3 illustrates front- and back-office operations with the relationship between customer touchpoints.

THE INTEGRATED AHP AND QFD MODEL

This integrated approach has been adopted in multiple sectors and achieved significant results, as mentioned; the process adopted in the research is published parallelly with this study.

The diagram (Figure 4) and the following steps summarize the application of this model:

Step 1: Define the goal, problem statement, and hypothesis.

Step 2: Collect information about MCDM methods and software success factors.

Step 3: Form the decision-making team from the stockholders.

Step 4: Define the needs and requirements.

Step 5: Define and collect technical criteria for the software selected.

Step 6: Rank the departmental needs and prioritize them.

Step 7: Measure the constituency of the weighted departmental needs.

Step 8: Fill out the relationship matrix.

Step 9: Rank the alternative software using AHP.

Step 10: Communicate the results.

MATERIAL AND METHODS

To understand the problem presented in the chosen company, a selected decision-making team from the company consisting of multiple stakeholder members, including the author, were responsible for working on this model.

Non-standardized unstructured interviews were conducted with the team leader and other selected team members (from the technical support team, the shipping team, the compliance team and the project manager) electronically, using the company communication platform "Slack." This type of interview was enough to define the problem and the aims. Many problems appeared with the current software. The most crucial parts were related to tracking customers' contact details using different channels, which caused incorrect amounts being paid to customers, as well as double payouts, and other important aspects related to monitoring agent productivity and tagging issues.

Following this, the decision team undertook an overall assessment of the currently used resources and the company's available funding.

The research uses an integrated MCDM method AHP with the QFD approach to assess whether there are better CRM software options on the market that meet the IT support team's requirements in the selected company.

The technical parameters were examined and collected from multiple sources, including the vendor's websites, magazines, and professional internet articles. The vendors top five list was defined by the company structure, size, and other variable parameters. The next step was to rank these listed parameters; then, the team ranked these needs using the MCDM method AHP.

To select the most suitable CRM software among a set of vendors, these vendors were considered to be the CRM alternative software in the model applied here. Since they provide multiple price packages that contain different features, the selected packages have the same degree of function for each software package.

The technical criteria for the CRM software in the QFD model are driven by the ERP system success factors, while the technical data collected about the vendors' technical information came from vendors' and professional websites.

The departmental needs and the alternative vendors' technical parameters were recorded and ranked according to the ranking method of Saaty (2008), then the relationship matrix was drawn up between the needs and technical parameters in the QFD model.

After filling out the data, the constituency of the ranked department is measured using the AHP constituency tool in order to obtain a verified and reliable decision or to re-rank and do the process again.

RESULTS AND EVALUATION

Defining the department needs (the What? part)

After defining and collecting information in the first two steps, the next step was to form the decision-making team and define the selected department's needs; this is required in order to establish the "What" part in the QFD model.

This team's needs have been collected with the collaboration of stakeholders, as shown in Figure 5, which include: the decision-making team using unstructured interviews with the team leaders, working agents, and the project manager using the company communication platform "Slack". A set of questions were drawn up, based on the selected teamwork experience in IT companies. In addition to fundamental questions collected from various professional websites (Select Hub team, 2019), these questions aim to define the company's operation size, the number of users and its planned budget, and to select the essential features needed from the CRM software.

The selected attributes that most affect the performance of a software package are:

- 1- **Price:** The price of the package includes the essential features needed.
- 2- **Customization:** This covers the ability to customize a new widget, dashboards, and edit the agent interface.
- 3- **Flexibility:** Integration with other platforms, apps, and programs to transfer data in and out. Web-based platforms have better integration with other websites or applications.
- 4- **Maintenance time/product support:** The firm's technical capability to do regular maintenance, respond to error reports, provide app training and guides, and frequently update with enhancements.
- 5- **Monitoring:** Includes the KPI (key performance indicator) and the ability to create custom indicators.
- 6- **Functional Requirements:** Support for multiple assistance platforms (phone, chat, e-mail), and having multiple departments and brands.
 - E-mail utilities
 - Compatibility with VoIP standards
 - Audit trail
 - Customer contact history
 - Knowledge creation and workflow
- 7- **Ease of use:** Predefined templates, tags, knowledge base, support for multiple languages and platforms, and support for different views.
- 8- **Security:** Provides Role-Based Access for different agents or leads, advanced encryption protects information. A history log of changes to avoid confusion between departments. Data

backs up automatically with a server protected against potential hacks.

- 9- **Support for internal communication:** Enables teams' internal communications, internal notes, involving team leaders, and escalations.
- 10- **Business Intelligence BI:** Includes data collection, data analysis, trends, chat BOT, or virtual agent assistance. BI functions work on measuring and monitoring the service factors carefully, including service level agreement (SLA), giving advice, and providing hints and reports based on repetitive queries that provide a faster response from agents. It is vital to create customized dashboards and add specific market tags to get the most accurate, reliable data.
- 11- **Deployment Environment:** Contains cloud support, freelancer support, online servers, a web-based platform, application usability, a contact history tracker, and payment trails. The web-based software servers and data that use the cloud are cheaper to establish and run, but they are riskier regarding security.
 - On-Premises.
 - Cloud/Web-Based.
- 12- **Reporting:** Supports performance, trend, quality, and customized reports, and manages them with the ability to export to other office programs. This report is critical to see the company's current status and where some higher demands or problems exist, in order to optimize the work processes.
- 13- **Reliability:** Product rating, financial background, awards won by the software, and what its market share is.
- 14- **Predictive Analytics:** Cooperates with business intelligence to get valuable results to anticipate the potential number of customers, and potential area of the problem.
- 15- **Social:** Covers the ability to manage different contact points and channels (Gmail, Facebook messages, SMS etc.).

Defining the technical parameters (the How? part)

The fifth step started by brainstorming the essential requirements in the CRM software:

- E-mail and social media channels.
- Primary help center, including call, chat and e-mail
- Web Widget & Mobile SDK
- Business rules
- Performance Dashboards
- Public apps and integrations
- Multilingual content
- CSAT surveys
- Custom reports & dashboards
- Custom agent roles
- Multi-brand support

- Multiple ticket forms
- Launch Success Program
- Satisfaction Prediction
- HR features and pipeline.

The next step is to select the functionalities aspects of the CRM software; these criteria will form the "How" part of the QFD Model with consideration to the suggested sources in a previous article (Adina, Intorsureanu and Mihalca, 2007), Capterra (<https://www.capterra.com/>), and SelectHub (<https://selecthub.com/>).

CRM technical criteria:

Core functionality: This includes the must-have features of the CRM software:

1. Contact Management: Managing customers and agents in different layers.
2. Data visualization: Finding and accessing the required information within the agent platform (knowledge base, ergonomic application, etc.).
3. Platform access: The number of supported platforms (mobile, windows, etc.)
4. Integration capability: Integration with e-mail, widget, apps, social media, websites.

Standard functionality: This is related to work efficiency and its unique attributes:

5. Flexible platform: Adjusting agent views and integrating with other software.
6. Customization ability: Customized tools, dashboards, platforms, and editable features.
7. Multiple Language support: The number of languages supported and multi-language knowledge bases.
8. Template support: Creating predefined e-mail templates, and macros that automate tags, answers, or triggers.
9. Technical capability: The vendor's technical capability to support the product by providing help when needed and responding to reported problems.

Market review:

10. User Satisfaction: Online ratings, comments, and reviews.
11. Permission control: Different permission for users to delete or create tickets, make direct phone calls, access reports and edit macros and triggers.
12. Reputation/Awards: The number of awards or number of high-class permanent customers.
13. Pricing models: The existing features package, and how much it fits the company's needs, and the support it gives for customized packages.

Extra Functionality

14. Escalations & follow up processes: Linking similar problems, creating follow up, assigning agents to tickets, and escalations to other departments.

15. Reports level: Customized reports, data collection, and analysis.

16. Developments tools: Support for collecting performance metrics and KPIs (SLA, total satisfaction etc.)

The rank of needs based on AHP

The sixth step will be ranking the departmental needs and prioritizing them using the MCDM method AHP.

The decision-making team ranked the needs according to the most critical factors. They then calculated w (i.e. an m -dimensional column vector) built by averaging the entries on each row of the standardized matrix. The final rank is presented in Table 1.

The most crucial factor is the functional requirements, with a robust infrastructure providing multiple options to connect with customers through e-mails, telephone, and SMS, efficiently managing all of them in one single platform.

The deployment environment came second. This shows how important it is to have a platform that supports freelancers (which form the main structure of the team) and have cloud servers with reliable regular backups.

The social environment came third, since having multiple integrated contact channels through social media into the leading platform is essential for proper customer relations management, enabling the company to track the history of customer contact in all of the methods, so the customer does not need to repeat him/herself to get the required assistance.

Calculating the Constituency

Measuring the constituency of ranked needs:

$$CI = \frac{X - m}{m - 1}$$

m presents the number of examined Criteria.

The scalar X is the average of the weighted needs divided by m .

$$X = \frac{\sum \text{weighted needs}}{m}$$

Low inconsistency values may be tolerated, depending on the number of factors or alternatives within the matrix.

For individual assessments, the CR should be less than one, but in group assessments, "A consistency ratio of less than 0.20 is considered suitable" (Ho, Newell, & Walker, 2005).

Moreover, according to Wedley (1993), CR accepted values could be extended depending on the matrix size and the number of people who are

doing the assessment, so true inconsistency is considered moderately consistent ($1 < CR < 2$).

$$CR = \frac{CI}{RI} < 0.2$$

In ranking the needs, the size of the matrix was $m=15$, $X= 18.840$.

The calculation for the consistency index was $CI = 0.274$.

The $RI = 1.5861$ - taken from Saaty (2008) – and the random index (RI) values are shown in Table 2. As a result the CR equals **0.173** based on 15 criteria, and this value is accepted, and decision-making ranks were considered consistent.

This high value was caused by the large number of requirements and individuals in the decision-making team. Regarding the alternatives ranking, all measured CRs were less than 0.1, as can be seen in Figure 9.

The Relationship Matrix

This matrix is at the heart of the QFD model. It presents the intercorrelation between the weighted department needs and technical software parameters. It can be described on a scale that differs between no correlation (0), weak correlation (1), medium correlation (3), and strong correlation (9) (Franceschini & Rupil, 1999).

Following this, the weight of the technical parameters is calculated by multiplying each matrix component with the needs calculated weight, then summing them up (Figure 6). Identifying key technical characteristics is essential to develop and compete with other competitors' software, by focusing resources on the most critical elements in CRM products to meet and support departmental needs in IT companies.

The most critical technical parameters, according to the IT department, are weighted needs, i.e. data visualization, platform access, and integration capability.

The ranking of the alternatives

After obtaining all the model elements, a set of alternative options is chosen to rank them using AHP, and then the best choice for the company is selected, based on departmental needs. These six vendors are Zendesk, Freshdesk, Zoho Desk, Kayako, Salesforce Service Cloud, and Freshsales. The vendor's technical information has been examined after being collected from multiple sources, including the vendor's websites, magazines, and professional internet articles (Albert et al., 2019; Captterra Team, 2019; Select Hub team, 2019) in order to rank the alternatives (competitors) using AHP.

The decision-making team did the ranking for the selected vendors by replicating the AHP ranking process for the fifteen requirements (each

requirement separately), breaking the complex decision into smaller, more straightforward decisions to compare every two vendors separately. After that, the average rank is taken for each vendor and the final results are obtained.

Figure 7 illustrates the rank regarding the price and the customization (from the department's requirements).

Zoho came first regarding price; it offers a very competitive features package with the lowest price compared with others.

On the other hand, Freshdesk led with Zendesk regarding customization. Zendesk has special customization capabilities: main module and widget customization, custom reports, dashboards, agent roles, and themes. Zendesk allows the creation of a self-service customer portal using its knowledge base and community features combined with the AI-powered bot, and allows the easy creation and customization of metrics, dashboards and reports without SQL (Nestor, 2020).

Zoho was ranked fourth, and only offers help desk customization, customization of tabs and fields, custom e-mail templates, default templates, ticket templates, views, field layouts, on hold status, reports, and dashboards.

Figure 8 shows the ranks for all competitors added to the QFD model.

The final matrix for competitive assessment is called the score matrix (S). It is formed after calculating the rank of each option (Figure 9).

The following formula calculates the rank:

$$v = S \cdot w$$

w is the weight vector of the needs

S is the calculated score matrix

The final rank is formed by summing them up (Figure 10).

Communicating the results

It can be seen that the best alternative option is Zoho Desk, followed very closely by Zendesk; so both solutions can be accepted as the best software that can meet the company's requirements.

Since the company is already using Zendesk, if it considered moving its service to Zoho Desk, it would benefit from the reduced-price, higher monitoring, better functional requirements, better social management and productive analysis tools. On the other hand, Zendesk has more flexibility, ease of use, higher security, and better reporting, as can be seen in Figure 8.

Also, it can be noticed that the deployment environment and internal communication were ranked identically for both vendors; these two requirements can solve company payment problems.

The central Hypothesis in this research was: "The software currently used in the selected company

does not offer the best customer service according to the requirements of the selected department." As a result, Hypothesis H0 must be rejected and H1 accepted, i.e. that the currently used software is the best available option within the market to meet the company's requirements. The company has to adjust its processes to solve current issues and review the ERP implementation approach and success factors to adjust current processes.

A remarkable result was the fact that the current position of the vendors according to their technical requirements and needs was made visible.

Figure 8 shows the weight of technical parameters with regards to the support team needs, illustrating the most critical factors: data visualization, platform access, and integration capability.

Alternatives should focus on improving these areas to win the CRM market in this transportation company, or any other IT company's customer support department.

CONCLUSIONS

It is always challenging to make decisions when there are a high number of criteria involved, especially when it comes to sophisticated essential software that defines the service provided by a company. Following the integrated approach proposed here, the author provided a full comprehensive review which enabled the assessment and selection of the best CRM software on the market, the analysis of six vendors, and the listing of their advantages and weak points.

The QFD approach considered stakeholders, and the AHP broke down the complex decision into smaller comparisons. Although the number of comparison elements was high, taking into consideration the 16 technical parameters and 15 needs collected through multiple resources, the AHP consistency tool measured the consistency of the ranked elements and improved decision quality. The Relationship Matrix defined the most critical technical parameters, showing where the vendors should focus on satisfying the company's needs. It can also be utilized in developing an existing product and CRM vendors in the market.

This model can be applied in solving complex problems in IT companies or departments, and software companies can benefit from this model to target a specific market and assess their position among competitors.

This research presented a case study that shows the benefits of applying this model. Furthermore, the results show the effectiveness of the model used.

Biographical Sketch

Hasan is a highly motivated Industrial Engineer who graduated as the top student in his class, then continued his education in Hungary and obtained

an MSc in Engineering Management. He was able to obtain practical work experience in international companies during his studies, which provided him with strong managerial and problem-solving skills. Currently, he is focusing on IT Management. His PhD is about the implementation of agile management in IT companies.

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LIST OF TABLES

Table 1
The rank of needs based on AHP

No	Needs	Weight number	Rank
1	Price	0.054	7
2	Customization	0.042	9
3	Flexibility	0.096	5
4	Maintenance time/product support	0.024	13
5	Monitoring	0.045	8
6	Functional Requirements	0.168	1
7	Ease of use	0.109	4
8	Security	0.009	15
9	Support internal communication	0.012	14
10	Business Intelligence	0.036	10
11	Deployment Environment	0.161	2
12	Reporting	0.032	11
13	Reliability	0.062	6
14	Predictive Analytics	0.025	12
15	Social	0.126	3

Source: Created by the author

Table 1
Saaty's CIR values for matrices

Size of Matrix	Random Consistency Index (RI)
1	0.000
2	0.000
3	0.580
4	0.892
5	1.116
6	1.236
7	1.332
8	1.395
9	1.454
10	1.488
11	1.5117
12	1.5356
13	1.5571
14	1.5714
15	1.5861

Source: Saaty (2008)

LIST OF FIGURES

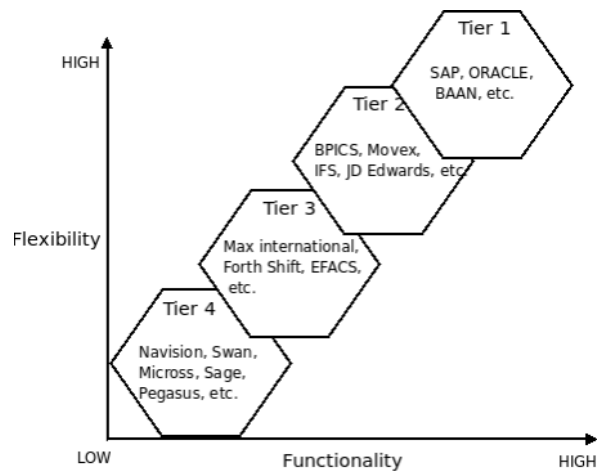


Figure 1
ERP four-tier classifications
Source: (Galın, 2011)

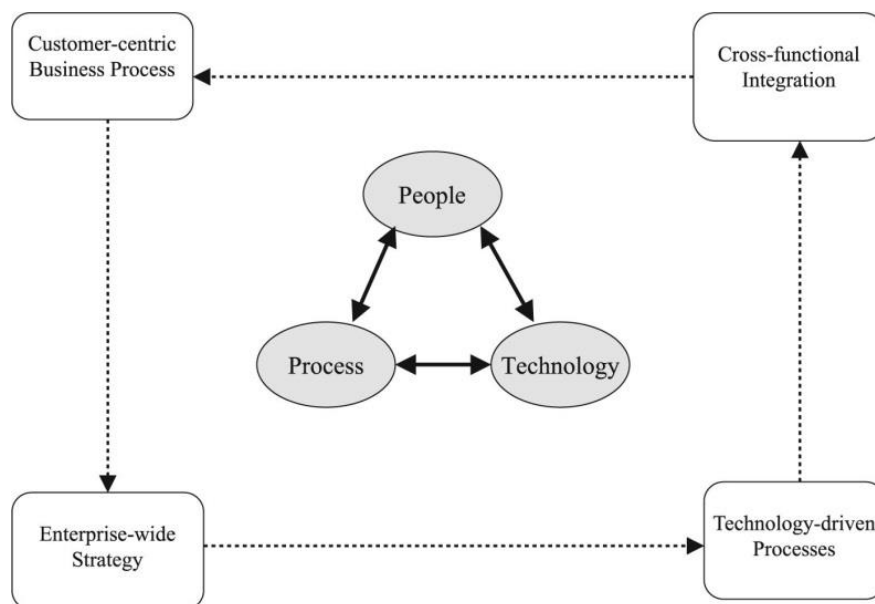


Figure 2
A CRM integration model
Source: Injazz and Popovich (2003)

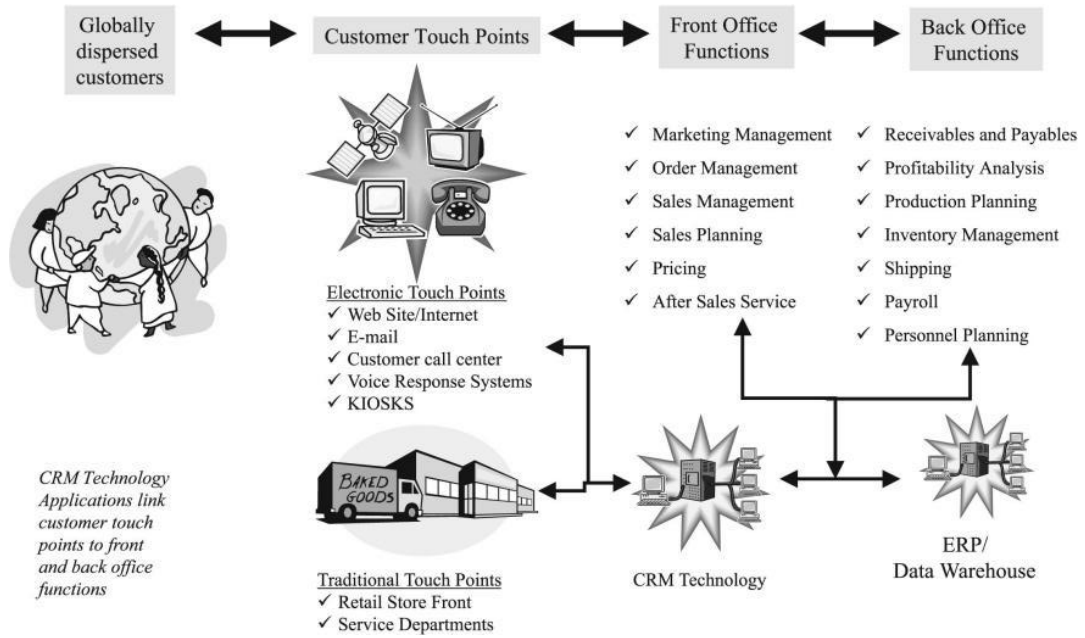


Figure 3
CRM applications, supported by ERP/data warehouse, link front- and back-office functions
 Source: Injazz and Popovich (2003)

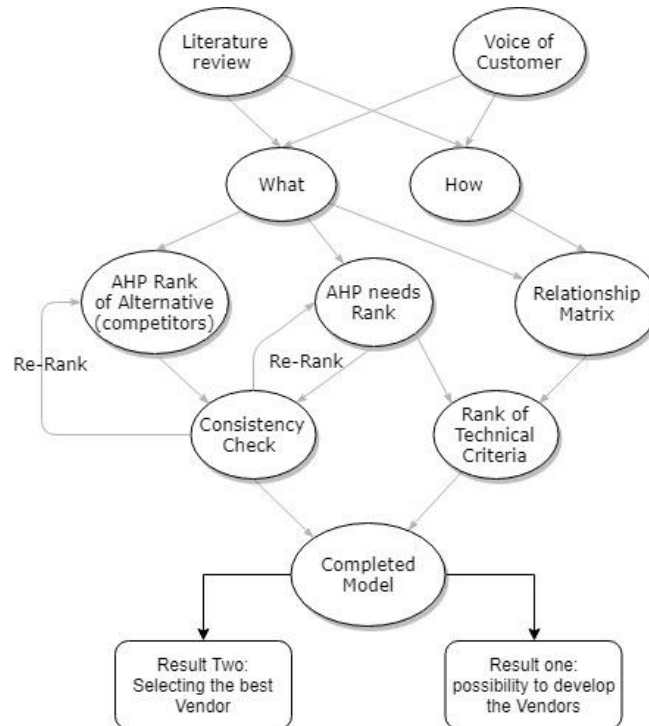


Figure 4
The process of the Integrated MCDM method AHP and the QFD approach
 Source: Created by the author



Figure 5
The Gathering Requirements process
Source: Created by the author

		Technical parameters (How?)																				
		Core functionality				Standard Functionality				Market review				Functionality								
		Contact Management	Data visualization	Platform access	Integration capability	Flexible platform	Customization ability	Multiple Language supported	Template support	Technical capability	User Satisfaction	Permission Control	Reputation/ Awards	Pricing models	Escalations & follow up	Reports level	Developments tools					
9	Strong																					
3	Middle																					
1	Weak																					
there is no relationship																						
Needs (What?)	1	Price	3	6	5	6	6	6	6	6	3	0	9	0	9	0	9	9	0.054	1.0	0.054	7
	2	Customization	0	9	9	3	9	9	5	9	9	0	7	0	0	4	3	3	0.042	1.0	0.042	9
	3	Flexibility	1	9	7	9	9	3	1	3	9	0	0	0	0	6	3	5	0.096	1.0	0.096	5
	4	Maintenance time/ product support	0	0	3	5	3	6	0	0	9	0	0	0	0	1	0	0	0.024	1.0	0.024	13
	5	Monitoring	3	1	1	3	3	5	0	0	0	0	0	0	0	0	9	9	0.045	1.0	0.045	8
	6	Functional Requirements	4	3	0	3	1	7	5	0	0	0	0	0	0	3	3	1	0.168	1.0	0.168	1
	7	Ease of use	6	9	9	3	9	5	7	9	0	0	3	0	0	0	1	0	0.109	1.0	0.109	4
	8	Security	3	3	0	0	0	4	0	1	5	0	9	0	0	2	0	0	0.009	1.0	0.009	15
	9	Support internal communication	5	6	3	0	0	0	0	0	0	0	0	0	0	9	0	3	0.012	1.0	0.012	14
	10	Business Intelligence	2	3	3	5	0	3	0	0	3	0	0	0	0	1	9	9	0.036	1.0	0.036	10
	11	Deployment Environment	7	7	9	4	1	3	0	3	0	0	7	0	0	3	0	0	0.161	1.0	0.161	2
	12	Reporting	1	0	3	3	0	3	0	0	3	0	0	0	0	3	9	9	0.032	1.0	0.032	11
	13	Reliability	0	0	6	0	0	0	0	0	9	9	9	5	0	0	0	0	0.062	1.0	0.062	6
	14	Predictive Analytics	0	0	0	0	0	3	0	0	0	0	0	0	0	0	9	9	0.025	1.0	0.025	12
	15	Social	3	5	3	9	0	0	3	1	3	0	0	0	0	0	3	0	0.126	1.0	0.126	3
Absolute weight		3.412	5.054	4.847	4.449	3.075	3.874	2.611	2.585	2.795	0.554	2.311	0.554	0.794	2.012	3.136	2.539					
Target Value		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0					
Relative weight		3.412	5.054	4.847	4.449	3.075	3.874	2.611	2.585	2.795	0.554	2.311	0.554	0.794	2.012	3.136	2.539					
Rank		5	1	2	3	7	4	9	10	8	15	12	15	14	13	6	11					
																		Needs Weight	Weight Ratio	Target score	Rank	

Figure 6
The QFD Relationship Matrix
Source: Created by the author

	Price						
	Zendesk	Freshdesk	Zoho Desk	Kayako	Salesforce Service Cloud	Freshsales	
Zendesk	1	1/3	1/3	1/2	4	1/2	11%
Freshdesk	3	1	1	1	4	2	24%
Zoho Desk	3	1	1	2	4	2	27%
Kayako	2	1	1/2	1	3	1	17%
Salesforce Service Cloud	1/4	1/4	1/4	1/3	1	1/3	5%
Freshsales	2	1/2	1/2	1	3	1	15%

	Customization						
	Zendesk	Freshdesk	Zoho Desk	Kayako	Salesforce Service Cloud	Freshsales	
Zendesk	1	1/2	2	3	1	3	20%
Freshdesk	2	1	2	4	1	4	28%
Zoho Desk	1/2	1/2	1	2	1/3	2	12%
Kayako	1/3	1/4	1/2	1	1/5	1/2	6%
Salesforce Service Cloud	1	1	3	5	1	3	26%
Freshsales	1/3	1/4	1/2	2	1/3	1	8%

Figure 7
Ranking the alternatives using AHP
Source: Created by the author

	Price	Customization	Flexibility	Maintenance time/ product support	Monitoring	Functional Requirements	Ease of use	Security	Support internal communication	Business Intelligence	Deployment Environment	Reporting	Reliability	Predictive Analytics	Social
w	0.05	0.04	0.10	0.02	0.04	0.17	0.11	0.01	0.01	0.04	0.16	0.03	0.06	0.03	0.13
S1	0.11	0.20	0.43	0.21	0.19	0.16	0.16	0.23	0.19	0.20	0.29	0.29	0.14	0.16	0.18
S2	0.24	0.28	0.12	0.34	0.11	0.07	0.25	0.07	0.11	0.07	0.18	0.11	0.36	0.38	0.22
S3	0.27	0.12	0.29	0.21	0.33	0.25	0.07	0.13	0.19	0.20	0.29	0.18	0.14	0.25	0.41
S4	0.17	0.06	0.05	0.12	0.19	0.10	0.10	0.36	0.11	0.07	0.11	0.29	0.05	0.11	0.10
S5	0.05	0.26	0.08	0.05	0.11	0.38	0.04	0.07	0.33	0.34	0.05	0.07	0.08	0.03	0.03
S6	0.15	0.08	0.03	0.08	0.06	0.04	0.38	0.13	0.06	0.12	0.07	0.05	0.23	0.07	0.06
CR	0.029	0.019	0.043	0.012	0.006	0.020	0.020	0.007	0.006	0.007	0.013	0.013	0.012	0.032	0.014

Figure 9
Score matrix for the alternatives
Source: Created by the author

Ranking the alternatives		
Zendesk	S1	21.8%
Freshdesk	S2	18.3%
Zoho Desk	S3	24.7%
Kayako	S4	11.0%
Salesforce Service Cloud	S5	13.3%
Freshsales	S6	11.0%

Figure 10
Final Alternative Rank/Assessment
Source: Created by the author

Core functionality		Technical parameters (How?)										Market review						Functionality				Competitive Assessment										
		Standard Functionality					User Satisfaction					Permission Control					Reputation/ Awards															Pricing models
Contact Management	Data visualization	Platform access	Integration capability	Flexible platform	Customization ability	Multiple Language supported	Template support	Technical capability	User Satisfaction	Permission Control	Reputation/ Awards	Pricing models	Escalations & follow up	Reports level	Developments tools	Needs Weight	Weight Ratio	Target score	Rank	Zendesk	Freshdesk	Zoho Desk	Kayako	Salesforce Service Cloud	Freshsales							
3	6	5	6	6	6	6	6	3	0	9	0	9	0	9	9	0.054	1.0	0.054	7	0.11	0.24	0.27	0.17	0.05	0.15							
0	9	9	3	9	9	5	9	9	0	7	0	0	4	3	3	0.042	1.0	0.042	9	0.20	0.28	0.12	0.06	0.26	0.08							
1	9	7	9	9	3	1	3	9	0	0	0	0	6	3	5	0.096	1.0	0.096	5	0.43	0.12	0.29	0.05	0.08	0.03							
0	0	3	5	3	6	0	0	9	0	0	0	0	1	0	0	0.024	1.0	0.024	13	0.21	0.34	0.21	0.12	0.05	0.08							
3	1	1	3	3	5	0	0	0	0	0	0	0	0	9	9	0.045	1.0	0.045	8	0.19	0.11	0.33	0.19	0.11	0.06							
4	3	0	3	1	7	5	0	0	0	0	0	0	3	3	1	0.168	1.0	0.168	1	0.16	0.07	0.25	0.10	0.38	0.04							
6	9	9	3	9	5	7	9	0	0	3	0	0	0	1	0	0.109	1.0	0.109	4	0.16	0.25	0.07	0.10	0.04	0.38							
3	3	0	0	0	4	0	1	5	0	9	0	0	2	0	0	0.009	1.0	0.009	15	0.23	0.07	0.13	0.36	0.07	0.13							
5	6	3	0	0	0	0	0	0	0	0	0	0	9	0	3	0.012	1.0	0.012	14	0.19	0.11	0.19	0.11	0.33	0.06							
2	3	3	5	0	3	0	0	3	0	0	0	0	1	9	9	0.036	1.0	0.036	10	0.20	0.07	0.20	0.07	0.34	0.12							
7	7	9	4	1	3	0	3	0	0	7	0	0	3	0	0	0.161	1.0	0.161	2	0.29	0.18	0.29	0.11	0.05	0.07							
1	0	3	3	0	3	0	0	3	0	0	0	0	3	9	9	0.032	1.0	0.032	11	0.29	0.11	0.18	0.29	0.07	0.05							
0	0	6	0	0	0	0	0	9	9	0	9	5	0	0	0	0.062	1.0	0.062	6	0.14	0.36	0.14	0.05	0.08	0.23							
0	0	0	0	0	3	0	0	0	0	0	0	0	0	9	9	0.025	1.0	0.025	12	0.16	0.38	0.25	0.11	0.03	0.07							
3	5	3	9	0	0	3	1	3	0	0	0	0	0	3	0	0.126	1.0	0.126	3	0.18	0.22	0.41	0.10	0.03	0.06							
3.412	5.054	4.847	4.449	3.075	3.874	2.611	2.585	2.795	0.554	2.311	0.554	0.794	2.012	3.136	2.539																	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0																	
3.412	5.054	4.847	4.449	3.075	3.874	2.611	2.585	2.795	0.554	2.311	0.554	0.794	2.012	3.136	2.539																	
5	1	2	3	7	4	9	10	8	15	12	15	14	13	6	11																	

Figure 8
The QFD model filled with the alternatives ranked with AHP
Source: Created by the author