An Approach for Selecting Software-as-a-Service (SaaS) Product

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Abstract

Software-as-a-Service (SaaS) helps organizations avoid capital expenditure and pay for the functionality as an operational expenditure. Though enterprises are unlikely to use SaaS model for all their information systems needs, certain business functionalities such as Sales Force Automation (SFA), are more seen to be implemented using SaaS model. Such demand has prompted quite a few vendors to offer SFA functionality as SaaS. Enterprises need to adopt an objective approach to ensure they select the most appropriate SaaS product for their needs. This paper presents an approach that makes use of Analytic Hierarchy Process (AHP) technique for prioritizing the product features and also for expert-led scoring of the products.

1. Introduction

Software as a Service (SaaS) is a software delivery paradigm in which the software is hosted off-premise and delivered via web. The mode of payment follows a subscription model [6]. SaaS helps organizations avoid capital expenditure and let them focus on their core business instead of support services such as IT infrastructure management, software maintenance etc. Hence, we see increasing number of organizations adopting SaaS, for business applications like sales force automation, payroll, and e-commerce [1]. In a Forrester survey, sales force automation application is found to be the top-ranked application being used as SaaS [4].

When several vendors offer SaaS based products, the selection of product becomes a key issue. It involves analysis of selection parameters and product offerings of the vendors. As multiple criteria are involved in decision-making, it is a multi-criteria decision-making (MCDM) problem [5]. Being a problem involving multi-criteria and multi-products, it can't be solved with mere judgment or intuition. The judgments may work fine, only when the selection parameters are few.

During selection process, usually the features are ranked or prioritized. The prioritization involves deciding the weights of parameters. While assigning judgmental weights, it is quite likely that the user judgment may be biased towards the key parameters only. This may lead to improper priority and incorrect weights being assigned to the parameters. To make an informed decision, it is necessary to have quantifiable values in the place of subjective opinions. We have proposed widely accepted expert driven analytical hierarchy process approach to deal with this problem.

Remaining part of this paper discusses SaaS product selection parameters based on literature study, methodology adopted, and application of AHP to the problem at hand followed by conclusion.

2. SaaS product selection parameters

Many factors are involved in selection of a software product. Based on experience and interviews with the experts, we propose factors for SaaS selection such as: Functionality, Architecture, Usability, Vendor Reputation, and Cost. These factors are selected primarily considering our case study of sales force automation (SFA).

2.1 Functionality

Functionality factor includes attributes that are typically called as functional modules of SFA. It includes: (i) *Contact and Activity Management* for tracking customer contacts. It ensures sales efforts are not duplicated. (ii) *Opportunity Management* helps track and manage opportunities through every stage of the sales pipeline. It includes functionality such as lead creation, lead-to-opportunity conversion, opportunity tracking, etc. (iii) *Sales Performance Management* supports territory and quota assignment to multiple levels of sales organizations from regions and districts to individual sales persons [3], (iv) *Sales Analysis* module provides dashboards and reports.

2.2 Architecture

The architecture factors are as follows: (i) *Integration* attribute includes ability of product to integrate with other applications. Integration attribute becomes quite relevant for SaaS products as SaaS products are hosted off-premise and hence can be perceived as difficult to integrate with the on-premise legacy systems. (ii)

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Scalability refers to the SaaS product's ability to maintain reasonable response time for users even during peak load. (iii) *Reliability* refers to the SaaS product's ability to remain available for the users for given time windows. It requires vendors to deploy monitoring and diagnostic tools; (iv) *Security* is considered to be the major concern for SaaS products. Vendor having certifications such as ISO 27000 helps ensure security adopted for handling of customer data.

2.3 Usability

Usability related attributes are as follows: (i) *User interface* includes facets such as intuitiveness, ease-of-use for frequently required tasks and aesthetic nature of graphical elements. (ii) *Help* attribute refers to availability of easy-to-use user manuals, eLearning modules, and context-sensitive help. (iii) *Support* for mobile device has become important as modern sales workforce extensively depends on the mobile devices such as PDA etc. (iv) *Offline support* is important. It means the SaaS products support a mechanism to let users work on system in offline mode and let them synchronize once connected to internet.

2.4 Vendor Reputation

Vendor reputation factor includes two attributes: (i) *Number of clients/users* indicates the level of usage, which roughly indicates whether the product is fairly new entry or is well-established one. (ii) The *brand value* of vendor is also important, as sometimes a new product from well-known vendor may be preferred over a product having vast customer base but being provided by not-so-well-known vendor.

2.5 Cost

Cost factor includes two attributes: *annual subscription* and *one-time implementation cost*. Usually, cost of hardware and support personnel is covered under annual subscription, while cost of initial consulting, configuration efforts, etc is covered under one-time implementation.

3. Analytical hierarchy process

SaaS selection based solely on judgment is a highly cognitive and tedious process which could be quite error prone. Humans are supposed to be very good at one to one comparison. If a problem is decomposed into clusters, and attributes are compared pairwise within the cluster, then decision problems can be solved easily with reduced cognitive load. Saaty developed the Analytic Hierarch Process (AHP) method, which is very useful in simplifying multi-criteria problems into hierarchy thus forming the comparison matrix to judge the weight. The AHP deals with intuitive, rational and/or irrational, multi-objective, multi-criteria decision making with certainty and/or uncertainty for any number of alternatives. It breaks down a problem into its smaller constituent parts forming hierarchy and then calls for only simple pair-wise comparison judgments. AHP has a formal way of dealing with inconsistencies and hence is not dependent on the decision analyst's ad hoc rules for consistency assurance [7,8].

The AHP process starts with hierarchy development. An advantage of hierarchy is that it allows focusing judgment separately on each of the several properties, which is essential for making a sound decision. Each element is compared with every other element to decide the importance of one element over the other on a '1 to 9' scale. The elements at every level of hierarchy are also compared in a similar way. The comparison is checked for inconsistency and should not be more than 10%. The comparison matrices are normalized, and Eigen vectors (or priorities) are calculated from it. AHP has provision to synthesize feedback of multiple experts to get a final prioritization.

4. SaaS selection methodology

The methodology adopted starts with the literature study to understand the parameters satisfying the application requirements. These parameters are discussed with the experts in the next phase and, hierarchy is developed.

The survey instruments of AHP are developed from this hierarchy. Two types of AHP survey instruments are developed for pairwise comparison. One is for comparison of parameters and the other for products comparison. The pair of comparison is judged on 1-9 scale. The survey respondents are only experts hence; number of responses required is limited. Five experts are selected for each survey. The mandatory requirement for expert is to have experience in using the SFA products and should evaluate the product before responding the survey. Three-part methodology is adopted for the SaaS product selection. The first part covers the prioritization of parameters while second part is about product comparison. The third part combines the results obtained from first two parts to rank the products.

5. Sales force automation case study

We have selected a case study of SaaS product selection for SFA at a mid-size professional services organization. SFA is one of the key ingredients of Customer Relationship Management systems.

The hierarchy considered for the SFA is shown in Figure-1. The hierarchy is only for the selection parameters and not the products. The pairwise comparison matrix at level-1 and level-2 of hierarchy, shown in Table-1, gives the global and local level prioritization respectively. These two prioritizations are synthesized to find out the weight of every attribute.

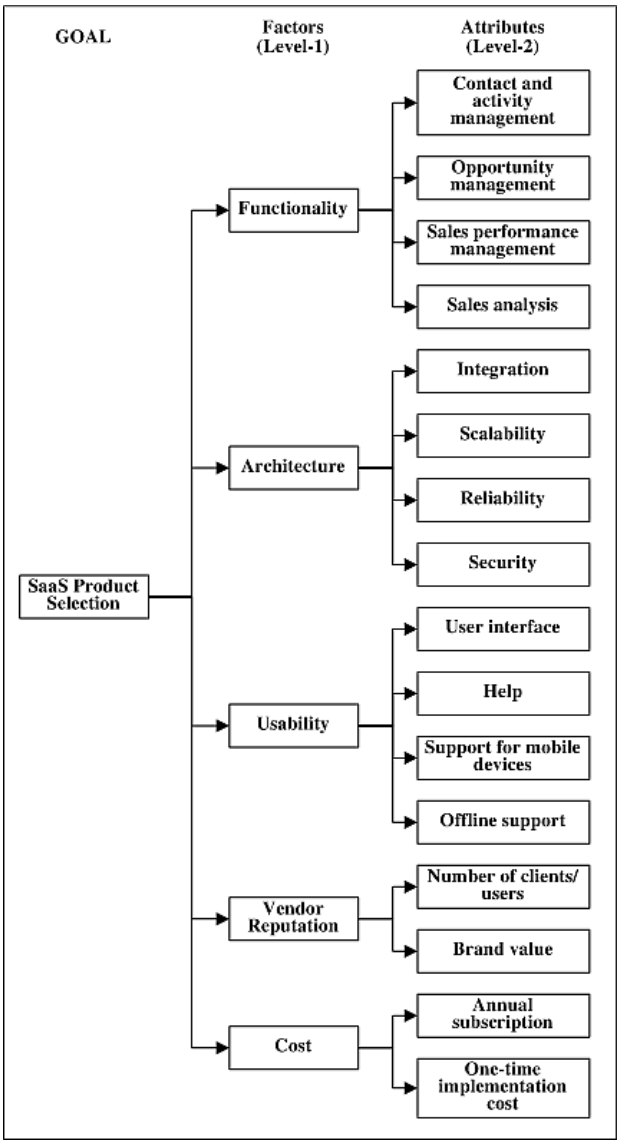

Figure 1: Hierarchy

The local weights of attributes are converted into the global weights using global weights of factors shown in Table-1. We have considered three leading SaaS products for SFA as A, B, and C instead of using their real names. Pair-wise one-to-one comparison survey is conducted for these product with respect to each attribute shown at level-2 of hierarchy. This comparison gives the scoring of every product with respect to the attributes.

Table 1: Global weights, local weight and converted global weight of attributes

Factors	Global Weight	Attributes	Local Weight	Converted Global Weight
Functionality	0.249	Contact and activity management	0.192	0.048
		Opportunity management	0.471	0.117
		Sales performance management	0.070	0.017
		Sales analysis	0.267	0.066
Architecture	0.069	Integration	0.143	0.010
		Scalability	0.072	0.005
		Reliability	0.361	0.025
		Security	0.424	0.029
Usability	0.373	User interface	0.431	0.161
		Help	0.063	0.024
		Support for mobile devices	0.333	0.124
		Offline support	0.173	0.065
Vendor Reputation	0.135	Number of clients/users	0.490	0.066
		Brand value	0.510	0.069
Cost	0.174	Annual subscription	0.516	0.090
		One-time implementation cost	0.484	0.084
TOTAL	1.000	**TOTAL**	5.000	1.000

Table 2: Product raw score with respect to attribute

Factors	Attributes	Raw Score of Product			Total (A+B +C)
		A	B	C	
Functionality	Contact and activity management	0.104	0.280	0.616	1.00
	Opportunity management	0.330	0.146	0.524	1.00
	Sales performance management	0.395	0.210	0.395	1.00
	Sales analysis	0.126	0.238	0.636	1.00
Architecture	Integration	0.123	0.456	0.421	1.00
	Scalability	0.085	0.405	0.510	1.00
	Reliability	0.233	0.286	0.481	1.00
	Security	0.098	0.606	0.296	1.00
Usability	User interface	0.101	0.392	0.507	1.00
	Help	0.261	0.394	0.345	1.00
	Support for mobile devices	0.083	0.261	0.656	1.00
	Offline support	0.158	0.346	0.496	1.00
Vendor Reputation	Number of clients/users	0.378	0.077	0.545	1.00
	Brand value	0.083	0.308	0.609	1.00
Cost	Annual subscription	0.379	0.195	0.426	1.00
	One-time implementation cost	0.433	0.223	0.344	1.00

The local weight of every attribute and raw score of every product are multiplied to get weighted score of product for each attribute. The ranked sum of weighted scores in descending order gives the ranking of the

products as shown in Table-3. The sum shows that the product 'C' is the most suitable option.

Table 3: Ranking of products

Factors	Attributes	Weighted Score of Product		
		A	B	C
Functionality	Contact and activity management	0.005	0.013	0.029
	Opportunity management	0.039	0.017	0.061
	Sales performance management	0.007	0.004	0.007
	Sales analysis	0.008	0.016	0.042
Architecture	Integration	0.001	0.004	0.004
	Scalability	0.000	0.002	0.003
	Reliability	0.006	0.007	0.012
	Security	0.003	0.018	0.009
Usability	User interface	0.016	0.063	0.082
	Help	0.006	0.009	0.008
	Support for mobile devices	0.010	0.032	0.082
	Offline support	0.010	0.022	0.032
Vendor Reputation	Number of clients/users	0.025	0.005	0.036
	Brand value	0.006	0.021	0.042
Cost	Annual subscription	0.034	0.018	0.038
	One-time implementation cost	0.036	0.019	0.029
		0.213	**0.271**	**0.516**

6. Related work

Though SaaS is a recent phenomenon, a good amount of research has been reported in the areas of configurability [6], security, integration, [2], networking challenges [9] and business mode [10]. However, there is no explicit guidance available on selection of SaaS product for business application such as sales force automation. At generic level, guidance on using quantitative methods for software selection and evaluation is available [11], which was adapted in the methodology described in this paper by suitably modifying the Decision Analysis Spreadsheet.

7. Conclusion

The selection of best possible SaaS product satisfying most of the requirements from available alternatives is a MCDM problem. This problem needs thorough understanding of requirements and product offerings. The selection process involves multiple criteria and multiple products; hence, selection based on judgements fails to identify suitable choice. The ranking process requires a crucial step of prioritizing the parameters and products. This step is usually performed manually and may be judgmental or based on some judgmental scales. These scales lack the rigor. This work suggests the use of AHP as the quantitative technique to address this issue. We have used AHP to calculate weights of selection parameters and scores for products. These weights and scores are more rational than subjective opinions.

A case study provides complete understanding of importance and significance of quantitative method to solve SaaS selection. This work also discusses the major parameters, which are useful in a SaaS selection.

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