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Website success comparison in the context of e-recruitment: An analytic network process (ANP) approach

Abbas Keramati[a,*], Mona Salehi[b]

[a] Associate Professor of Industrial Engineering Department, Faculty of Engineering, University of Tehran, Tehran, Iran
[b] Lulea University of Technology, Sweden

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ABSTRACT

This study investigates relative importance of website success factors in selecting the most preferred website. To identify relative importance of website success factors and to rank alternative websites with respect to success factors, Updated Delone and McLean Information System Success Model is extended through applying an analytic network process (ANP) approach. A field study with 383 academic internet users was performed. Relative importance of each website success factor with respect to their influence on using the e-recruitment website, and user satisfaction are identified. Furthermore relative significance of using the e-recruitment website and user satisfaction in achieving positive benefits are discovered. This study also found the relative preference of each website with respect to different success variable.

Results indicate that ANP is an effective tool to provide an accurate solution for interdependencies that are able to affect the decision to be made for network like models. The findings of this study provide decision makers of e-commerce companies with useful insights to compare the preference of their website with others with respect to different success variables. Moreover, relative significance of different success variables in websites can be compared.

1. Introduction

Website changes the role of a consumer from a passive recipient to a proactive one [1]. Hence, e-commerce is the shift of the power toward the consumer, which contributes to fundamental changes in the way companies relate to their customers and compete with one another [2]. There are almost no barriers for customers to switch to an alternative websites if performance is unacceptable [3].

Some preliminary studies [4] indicate a wide gap between anticipated and actual achievements from e-commerce systems. This has motivated a number of studies to look for factors that inhibit e-commerce success [5].

Online recruitment services are among the most popular applications on the internet [6]. Since employers are required to pay for the service, their perceptions of the level of service are typically the concern of most recruitment websites and the recruitment service quality level for the job seekers is typically ignored [7]. Therefore, study of e-recruitment websites success from jobseekers' perception is of prominence for one e-recruitment website to stay profitable in competitive environment.

Recently, online recruitment websites started working in Iran. According to Amuzegar [8], Iran's current active labor force is broadly estimated to be less than 32% of the total population. This figure compares poorly with the 50–60% labor participation in other countries.

This study has two objectives: the first is to find relative importance of e-recruitment website success factors and the second is to find relative preference of e-recruitment websites with respect to each website success factor in Iran.

2. Background

2.1. Evaluating e-recruitment website success

Several models have been developed from 1980s for investigating Information System (IS) success and the broader term website success. However, few studies considered the combination of information system quality and online service quality variables as components of website success. Updated Delone and McLean IS Success Model [9] (Fig. 1) is one of the highly cited models; which concerns both IS and Service quality as antecedents of website success. This model can be adapted to measurement challenges of new e-commerce world [9]. Delone and McLean [10] classified

* Corresponding author. Tel.: +98 21 88021067; fax: +98 21 82084194.
E-mail addresses: keramati@ut.ac.ir (A. Keramati), monaasalehi@gmail.com (M. Salehi).

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Table 1
e-Commerce success measures [10].

Reference	Dimensions of Updated Delone and McLean IS Success Model (2003)	e-Commerce success measures	Definition
Daughtrey [11]	Service quality	Assurance	Report of experience of other customers
Iwaarden et al. [12]		Empathy	Virtual assistant, offering product and services to online customers
Iwaarden et al. [12]		Responsiveness	Giving prompt service, amount of time it takes to download a Web page
Friedman et al. [13]	System Quality	Privacy	Protection of personal information
Palmer [14]; Molla et al. [15]		Ease of navigation	
Palmer [14]		Customization	Interaction with website users
Molla et al. [15]	Information Quality	Dynamic content	Prepared fresh information for each individual viewing
Barua et al. [16], Molla et al. [15]		Content personalization	Delivered content in real-time specific to the individual
Palmer [14]		Variety of information	Diversity of information on the website
D'Ambra et al. [17]; Molla et al. [15]	Use	Number of applications sent through e-recruitment website	Number of purchases completed
Reichheld and Schefter's [18]	User satisfaction	Repeat visits	e-Loyalty
D'Ambra et al. [17]	Net benefits	Better decision	To make better decision because of information on the website

newly developed measures in e-commerce environment, into six dimensions of Updated Delone and McLean IS Success Model [9] (Table 1).

2.2. ANP structure of e-commerce website success

Saaty [19] states that because of the interaction and feedbacks between different levels of the structure, many decisions cannot be structured hierarchically, because they involve the interaction and dependence of higher level elements on lower level elements. According to Saaty [20], ANP is the first mathematical theory that makes it possible to deal systematically with all kinds of dependence and feedback.

Updated Delone and McLean IS Success Model [9] does not have a linear top to bottom form of a hierarchy but looks more like a network with cycles connecting its cluster of elements. Therefore to identify relative importance of different success variable and to rank alternative websites, Updated Delone and McLean IS Success Model [9] will be developed through analytic network process (ANP) approach [21].

Lee et al., [22], investigated the effect of website quality on e-business success. They extended original Delone and McLean IS Success Model [23] by applying an analytic hierarchy process approach. Delone and McLean IS Success Model [23] has a linear top to bottom form of a hierarchy. By adopting DeLone and McLean's IS Success Model [23] and applying an AHP method, Lee et al., [22] investigated relative importance of each success factor in ranking the alternative websites.

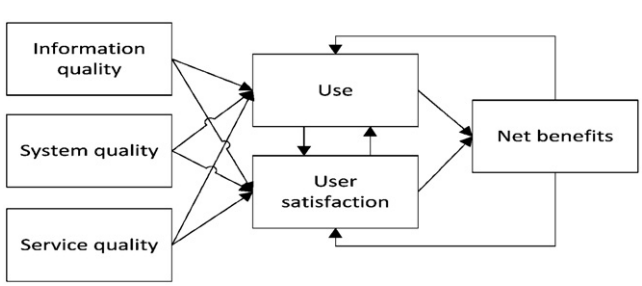

Fig. 1. Updated Delone and McLean IS Success Model [9].

According to Saaty [20], ANP is the first mathematical theory that makes it possible to deal systematically with all kinds of dependence and feedback. Although several quantitative techniques have been applied, this study has presented the ANP as a decision analysis tool in investigating website success factors and capturing interdependencies among various criteria which has rarely been applied in investigation of website success.

Eliciting preferences of various components and attributes requires a series of pair-wise comparisons where the decision maker will compare two components at a time with respect to source or parent criterion. Nodes that are to be pair-wise compared are always all in the same cluster and are compared with respect to their parent (source) element, the node from which they are connected. This results in local priorities of the nodes with respect to the source node. Saaty [24] has suggested a scale of 1 to 9 when comparing two components, with a score of 1 representing indifference between the two components and 9 being overwhelming dominance of the component under consideration over the comparison component (Appendix A). Updated Delone and McLean IS Success Model is shown in Fig. 1. In Fig. 2, Delone and McLean Updated IS Success Model is extended through ANP in this study.

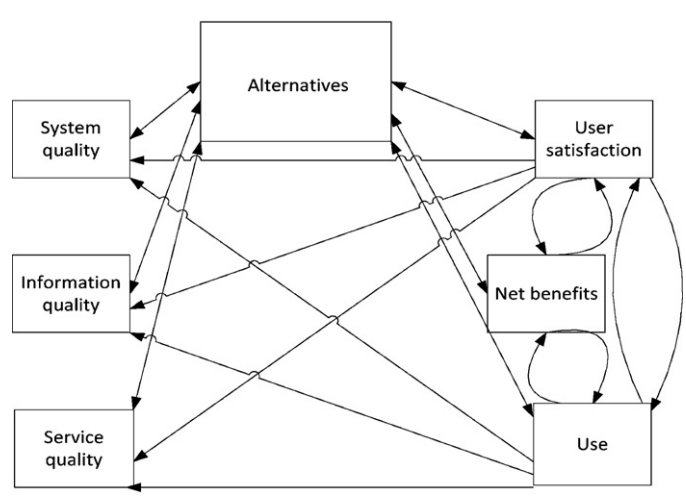

Fig. 2. Delone and McLean Updated IS Success Model extended through ANP.

Table 2
Unweighted supermatrix.

		Alternatives		Information quality			Service quality			System quality			Use	User satisfaction	Net benefits	
		Agahjobs	Irantalent	Content personal-ization	Dynamic content	Variety of information	Assurance	Empathy	Responsi-veness	Customi-zation	Ease of navigation	Privacy	Number of transactions executed	Repeat visits	Better decision	Time saving
Alternatives	Agahjobs	0	0	0.111	0.125	0.143	0.099	0.111	0.167	0.125	0.125	0.111	0.143	0.099	0.111	0.125
	Irantalent	0	0	0.889	0.874	0.857	0.9	0.889	0.833	0.875	0.875	0.889	0.857	0.9	0.889	0.875
Information quality	Content personalization	0.35	0.35	0	0	0	0	0	0	0	0	0	0.325	0.358	0	0
	Dynamic content	0.341	0.398	0	0	0	0	0	0	0	0	0	0.462	0.341	0	0
	Variety of information	0.309	0.252	0	0	0	0	0	0	0	0	0	0.212	0.301	0	0
Service quality	Assurance	0.322	0.333	0	0	0	0	0	0	0	0	0	0.386	0.312	0	0
	Empathy	0.369	0.398	0	0	0	0	0	0	0	0	0	0.272	0.372	0	0
	Responsiveness	0.308	0.268	0	0	0	0	0	0	0	0	0	0.342	0.316	0	0
System quality	Customization	0.332	0.397	0	0	0	0	0	0	0	0	0	0.361	0.298	0	0
	Ease of navigation	0.317	0.304	0	0	0	0	0	0	0	0	0	0.314	0.324	0	0
	Privacy	0.351	0.298	0	0	0	0	0	0	0	0	0	0.325	0.377	0	0
Use	Number of transactions executed	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1
User satisfaction	Repeat visits	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1
Net benefits	Better decision	0.472	0.099	0	0	0	0	0	0	0	0	0	0.111	0.143	0	0
	Time saving	0.528	0.9	0	0	0	0	0	0	0	0	0	0.889	0.857	0	0

Table 3
Cluster Matrix.

	Alternatives	Information quality	Service quality	System quality	Use	User satisfaction	Net benefits
Alternatives	0	1	1	1	0.157	0.241	0.352
Information quality	0.179	0	0	0	0.164	0.143	0
Service quality	0.179	0	0	0	0.174	0.154	0
System quality	0.145	0	0	0	0.161	0.159	0
Use	0.169	0	0	0	0	0.154	0.356
User satisfaction	0.162	0	0	0	0.172	0	0.291
Net benefits	0.166	0	0	0	0.171	0.149	0

Overall research questions are formulated as: "What is the relative importance of website success factors in selecting the most preferred e-recruitment website?" and "what is the relative preference of e-recruitment websites with respect to each success factor?"

3. Research methodology

In order to investigate the relative importance of website success factors in selecting the most preferred website, an internet mediated questionnaire based field survey was conducted on common users of the only two Iranian e-recruitment websites, www.irantalent.com and www.agahjobs.com.

To choose a sampling frame from e-recruitment users, an online academic union is used. Sampling frame consists of 100,000 university graduated individuals in Iran. According to selecting a probability sample [25], simple random sampling is selected as the most appropriate sampling technique. The minimum sample size required for the population of 100,000, with confidence level of 95%, and confidence interval of 5 has been calculated and is equal to 383.

In the questionnaire cover letter it is mentioned that the objective of this research is comparing two e-recruitment websites, and only the members of both websites are eligible to answer the questionnaire. 55 responses were received, and the portion of the unanswered questionnaires was due to ineligibility of respondents, according to not using both e-recruitment websites.

In order to achieve credibility of the results several precautions were taken. After establishing a questionnaire according to Saaty [26], a review on the questionnaire was made by independent individuals. First, experts were consulted to ensure that questions were properly phrased. Success variables were defined briefly in a glossary section of the questionnaire to insure that the meaning of Updated Delone and McLean IS Success variables is not misunderstood by respondents. After that, ANP experts conducted a review on questionnaire to make certain that pairwise comparisons are established properly.

Due to inevitable inconsistency among the judgments, it is necessary to measure the inconsistency index to eliminate inconsistent judgments for each group of pairwise comparisons for each respondent. Therefore, prior to the analyzing phase of this study, inconsistency ratio for matrices bigger that 2×2 was calculated to ensure that ratio is in an acceptable level of inconsistency.

4. Data analysis

ANP approach is capable of handling interdependence among elements by obtaining the composite weights through the development of a supermatrix [27].

In order to construct group judgments from individual judgments, geometric mean of each pairwise comparison is computed. The group judgment is the input of the SuperDecisions™ software.

The priorities derived from the pairwise comparisons are entered in the unweighted supermatrix. The unweighted supermatrix contains the local priorities derived from the pairwise comparisons throughout the network that shown in Fig. 2. All the local priorities can be read directly from the unweighted supermatrix (Table 2).

The cluster themselves must be compared to establish their relative importance and use their priorities to weight the supermatrix [19] (Table 3).

The weighted supermatrix (Table 4) is obtained by multiplying all the elements in a component of the unweighted supermatrix by the corresponding cluster weight [19].

According to Saaty [19], limit supermatrix is gained from the weighted supermatrix by raising it to powers until all columns are identical to within a certain decimal place.

The relative website success of the alternatives, Irantalent and Agahjobs, from the limit supermatrix is: 0.33, and 0.05 (Table 5). The priorities of all nodes can be read from the limit supermatrix.

The synthesized priorities for each alternative are shown in Table 6. According to synthesized priorities Irantalent.com website has the 87.75% of website success, and Agahjobs.com website has 12.24%.

5. Results

The major contribution of this study lies in the development of a frame of reference, which incorporates interrelated success factors in Updated Delone and McLean IS Success Model [9] for the selection of a successful e-recruitment website and finding relative importance of success factors. By adopting Updated Delone and McLean IS Success Model [9], and applying ANP approach, this study investigated factors affecting website success, their relative importance, interdependencies among success factors, and the priority of alternative websites.

This study suggests that ANP is an effective tool to provide solution for interdependencies that are able to affect the decision to be made for network like models. This study presents ANP for measuring the relative importance that captures interaction and feedback in Updated Delone and McLean IS Success Model [9].

5.1. Relative importance of success factors

Results of local priorities derived from pairwise comparisons can be read from weighted supermatrix (Table 4).

Highest preference of Irantalent (0.9) to Agahjobs (0.1) is with respect to *assurance*. In contrast, preference of Irantalent (0.13) to Agahjobs (0.022) with respect to *number of applications executed through the website* was the lowest.

It was found that importance of website quality factors in alternative websites perceived differently by online users. While information quality is ranked higher in both websites, the ranking order of information quality measures was different. *Content personalization* (0.063) and *dynamic content* (0.061) are relatively better ability of Agahjobs. In a different manner, *dynamic content* had the highest weight of 0.071 in Irantalent, followed by *content personalization* (0.063). Information quality becomes less significant with respect to *providing variety of information* in both websites.

Table 4
Weighted Supermatrixes.

		Alternatives		Information quality			Service quality			System quality			Use	User satisfaction	Net benefits	
		Agahjobs	Irantalent	Content personal-ization	Dynamic content	Variety of informa-tion	Assurance	Empathy	Responsiveness	Customization	Ease of naviga-tion	Privacy	Number of transactions executed	Repeat visits	Better decision	Time saving
Alternatives	Agahjobs	0	0	0.111	0.125	0.143	0.1	0.111	0.167	0.125	0.125	0.111	0.022	0.024	0.039	0.044
	Irantalent	0	0	0.889	0.875	0.857	0.9	0.889	0.833	0.875	0.875	0.889	0.13	0.219	0.313	0.308
Information quality	Content personalization	0.063	0.063	0	0	0	0	0	0	0	0	0	0.053	0.051	0	0
	Dynamic content	0.061	0.071	0	0	0	0	0	0	0	0	0	0.076	0.049	0	0
	Variety of information	0.055	0.045	0	0	0	0	0	0	0	0	0	0.035	0.043	0	0
Service quality	Assurance	0.058	0.059	0	0	0	0	0	0	0	0	0	0.067	0.048	0	0
	Empathy	0.066	0.071	0	0	0	0	0	0	0	0	0	0.047	0.057	0	0
	Responsiveness	0.055	0.048	0	0	0	0	0	0	0	0	0	0.059	0.049	0	0
System quality	Customization	0.048	0.058	0	0	0	0	0	0	0	0	0	0.058	0.047	0	0
	Ease of navigation	0.046	0.044	0	0	0	0	0	0	0	0	0	0.05	0.052	0	0
	Privacy	0.051	0.043	0	0	0	0	0	0	0	0	0	0.052	0.06	0	0
Use	Number of transactions executed	0.169	0.169	0	0	0	0	0	0	0	0	0	0	0.154	0.356	0.356
User satisfaction	Repeat visits	0.162	0.162	0	0	0	0	0	0	0	0	0	0.172	0	0.291	0.291
Net benefits	Better decision	0.078	0.016	0	0	0	0	0	0	0	0	0	0.019	0.021	0	0
	Time saving	0.087	0.149	0	0	0	0	0	0	0	0	0	0.152	0.127	0	0

Table 5
Limit Supermatrix.

		Alternatives		Information quality			Service quality			System quality				Use	User satisfaction	Net benefits
		Agahjobs	Irantalent	Content personal-ization	Dynamic content	Variety of informa-tion	Assurance	Empathy	Responsiveness	Customization	Ease of naviga-tion	Privacy	Number of transac-tions executed	Repeat visits	Better decision	Time saving
Alternatives	Agahjobs	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046
	Irantalent	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331
Information quality	Content per-sonalization	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
	Dynamic content	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	Variety of information	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
Service quality	Assurance	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
	Empathy	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038
	Responsiveness	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031
System quality	Customization	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
	Ease of navigation	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028
	Privacy	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
Use	Number of transactions executed	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116
User satisfaction	Repeat visits	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109
Net benefits	Better decision	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
	Time saving	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085

Table 6
The synthesized results for the alternatives.

Alternatives	Raw	Normals	Ideals
Agahjobs	0.05	0.12	0.14
Irantalent	0.33	0.88	1

Considering system quality, Agahjobs's ability in providing *privacy* (0.051) is relatively more in comparison with other two system quality measures. However, *customization* (0.058) is relatively more significant in Irantalent.

Regarding service quality, *empathy* is mentioned as relatively most significant measure in Irantalent (0.071) and Agahjobs (0.066). Unlike, *responsiveness* is regarded as the less significant measure in both Irantalent (0.048) and Agahjobs (0.055). Since responsiveness is regarded as the amount of time it takes to download a webpage, one reason could be the low internet speed in Iran.

In addition, *time saving* measure is relatively more consequential in both Irantalent (0.149) and Agahjobs (0.087) than *better decision because of information on the website*.

Regarding information quality, *dynamic content* (0.076) is remarked as the most important factor which affects using the e-recruitment website, whereas *content personalization* (0.051) is considered to be the most significant contributor to user satisfaction.

While *assurance* (0.067) is mentioned as relatively most important service quality measure which influences using the e-recruitment website, *empathy* (0.047) is relatively less significant measure. Unlike, users believe that *empathy* (0.057) affects their satisfaction relatively the most in comparison with *assurance* (0.048) and *responsiveness* (0.049).

Customization is considered as relatively more consequential system quality measure that affects using the website (0.058), but this measure becomes less significant in user satisfaction (0.047). Meanwhile, *privacy* (0.06) measure affects users' satisfaction relatively the most.

e-Recruitment websites' users consider *time saving* as relatively more beneficial factor which leads to using the e-recruitment website (0.152) and also satisfaction from the website (0.127).

5.2. Relative influence of success factors on website success

According to limit supermatrix (Table 5) the priority and importance of each success factor is achieved with respect to its influence on website success.

Dynamic content (0.04) has the highest influence on e-recruitment website success, whilst *variety of information* (0.026) has the relative less contribution to e-recruitment website success. It is surprising that both of *dynamic content* and *variety of information* are the measures of information quality category in Updated Delone and McLean IS Success Model [9].

With respect to system quality category, *customization* (0.033) is highly ranked, indicating that companies should spend more effort to make a design that can be personalized by the users, so that they can have their own version of the website. Meanwhile, *ease of navigation* (0.028) influence is relatively less significant in e-recruitment website success.

Considering service quality category, *empathy* (0.033) comparatively has got most attention from online users, noting that companies should deploy a virtual assistant on the website. The relative unimportance of *responsiveness* (0.028) in comparison to other service quality measures is apparent in the limit supermatrix.

Time saving is found to be more beneficial success factor (0.085) in comparison to *better decisions because of information on the website* (0.014).

Synthesized results (Table 6) support that *Irantalent* is chosen as the prior e-recruitment website with higher weighted score (0.88) against *Agahjobs* (0.12).

6. Recommendations

According to the empirical findings, it is recommended that Agahjobs.com further enhance its assurance success measure by providing previous customers' experience on the website. As it was discussed earlier, this measure was found to be far stronger in Irantalent.com. Furthermore, this measure is the most important service quality measure that influences using the e-recruitment website. Also from the system quality point of view, it is suggested that Agahjobs.com improve ease of navigation by providing functions that help customers finding what they need without difficulty and possessing a good search engine.

It is highly suggested to Irantalent.com to improve privacy that makes users' identity confidential. Since privacy is considered as key evaluative criteria in online services.

Moreover, with respect to information quality, it is recommended that both Irantalent.com and Agahjobs.com provide variety of information on their websites to increase the information quality.

Appendix A.

This appendix includes a condensed version of the survey instrument. Due to its considerable length, the entire survey is not included.

On the cover letter, it is mentioned that for one thing, the aim of the research is to compare relative importance of two websites' success factors. Moreover, the research is to find out relative preference of each website with respect to different success variables from users' perception. Therefore, jobseekers who are the common users of both e-recruitment websites are eligible to answer the questionnaire.

A glossary of literature terms is also included in this questionnaire for users' information.

For survey questions, we included the following table. It is mentioned that Scale of 1–9 is used for two components, with a score of 1 representing indifference between the two components and 9 being overwhelming dominance of the component under consideration.

	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	
Variable1																		Variable2

1. Compare the relative importance of information quality, system quality, and service quality in choosing the most preferred website.
2. Through which website you sent more applications?
3. Which website do you visit more regularly?
4. Which website do you prefer based on better decisions because of information on the web?
5. Which website helps you with saving your time more?
6. Compare the relative importance of assurance, empathy, and responsiveness in sending more applications through the website.
7. Compare the relative importance of dynamic content, content personalization, and variety information in more regular visits to website.
8. Compare the relative impact of better performance in comparison with competitors and satisfaction with website on using the e-recruitment website.
9. Compare the relative impact of system quality, information quality, and service quality on user satisfaction.

10. Compare the relative impact of use and user satisfaction on net benefits.

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