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Evaluating Quality of Matrimonial Websites: Balancing Emotions with Economics

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ABSTRACT

There are a plethora of studies evaluating the quality of websites on functional and design-related aspects such as usability and visual parameters. The majority of these studies are related to e-commerce websites where individuals make decision largely relying on economic parameters. However, matrimonial websites are unique, as the decisions involve both economic and non-economic parameters. Therefore, this study aims to propose a framework to evaluate quality of matrimonial websites by incorporating contextual factors and examine differences among different groups of users. This study proffers a website evaluating framework considering non-economic and emotion based factors from the information systems (IS) success model and the search match interaction (SMI) framework. The study proposes a hybrid model of multi-criteria decision-making techniques—namely Fuzzy-AHP and ranking models such as evaluation based on distance from average solution (EDAS), technique for order of preference by similarity to ideal solution (TOPSIS), and complex proportional assessment (COPRAS). The results indicate that the context-specific factors related to search and matchmaking options are the most preferred parameters for evaluation. Males and females have been found to differ in their preferences related to service quality and price. Next, the study compares the performance of three ranking models, namely EDAS, TOPSIS, and COPRAS. The first and second models provide similar results, while the rankings obtained through COPRAS differ slightly. The study contributes towards website evaluation literature by highlighting the importance of contextual factors while evaluating the matrimonial websites and the differences among preferences of the users.

KEYWORDS

Website Quality, Consumer Decision Making, Information Management, MCDM, Fuzzy AHP, EDAS, TOPSIS, COPRAS

INTRODUCTION

Social networking sites have emerged as a source of initiating friendship relationships, while discussion forums aid work-related relationships (Sprecher, 2009). With the expansion of internet and computer-mediated communication over a period of time, virtual interactions on the web are providing a safe way for different kinds of relationships (Chakraborty, 2012). Similarly, for people interested in initiating romantic relationships, different kinds of services, such as online dating and matchmaking services, have become popular. As per the survey conducted by the Pew Research

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Centre[1], 38 percent of adult singles looking for a partner have used online dating services in the USA, and 23 percent of such online daters have met someone whom they married or have a long-term relationship. The revenue of the online matchmaking industry is expected to grow at a compound annual growth rate (CAGR) of 9.1% annually for 2020-2024[2]. The revenue of matchmaking industry is expected to grow at a CAGR10 percent in India and 9.5 percent in China[3]. The increase in the number of users in developing countries can be attributed to a higher penetration of the internet and a rising level of consumer awareness.

Amid the lockdowns imposed due to COVID-19, online matchmaking services are witnessing a surge in user activities and the enrolment of new users. Major players of online matchmaking industry in India have reported around 30 percent rise in profile acquisitions and interactions among the users (Tejaswi, 2020). These service providers have been introducing new features like video calling option to distinguish from themselves from others and garner the attention of more consumers. The online matchmaking can be categorized into E-matrimony and dating websites. People use dating websites to casually meet new people, while the users of e-matrimony have serious intentions to get married. Given the seriousness and commitment of the users, it becomes crucial for service providers to understand their needs and personalize the services accordingly. As the website of a service provider is the primary interface for the customers, it is crucial to pay attention towards improving the quality of the website.

Researchers argue in favor of a positive relationship between the website quality and the market performance of e-businesses (Lee & Kozar, 2006), and the quality of a website has been found to positively influence the purchase intentions, satisfaction, and loyalty of the consumers (Chen, Huang, & Davison, 2017). Owing to the importance of websites in enhancing business performance, researchers have examined the factors contributing towards website quality (Bastida & Huan, 2014; Cebi, 2013; Chou & Cheng, 2012; Lee & Kozar, 2006). The majority of the studies are concentrated in the context of e-commerce websites. However, the models developed for e-commerce websites may not be directly applicable to matchmaking websites, as the two kinds of businesses differ both in their offerings and in the nature of decisions made by their consumers.

Past researchers contend that on a traditional e-commerce website most consumers are rational economic actors who select an alternative only after considering all the relevant information (Gopi & Ramayah, 2007). However, while a logical process is certainly a key factor in considered purchases on matrimonial websites, emotional decision-making also plays a critical role (Ahuvia & Adelman, 1992; Schwarz, 2000). Plausibly, it has become important that even a matrimonial website should capture both the rational logical and the emotional aspects of the experience by integrating new features. Given the uniqueness of this context, evaluation of matrimonial websites warrants a scientific inquiry.

Additionally, the Indian marriages differ from those in the Western world in the variety of traditions involved. The 'arranged' marriages have been the long-standing tradition in Indian context and the process varies depending on region, caste, and religion. A number of factors ranging from horoscope matching, caste, to professional qualifications play crucial role in selecting a partner (Titzmann, 2013). As per Indian traditions, marriage is not only a union of two individuals but the commencement of a new relationship between two families. The marriages are so important to the parents that they spend

[1] The Pew Research Centre. Retrieved from: http://www.pewinternet.org/2013/10/21/online-dating-relationships/ (last accessed on 14th August, 2020)

[2] Statista. (Matchmaking). Retrieved from: https://www.statista.com/outlook/371/100/matchmaking/worldwide (last accessed on 14th August, 2020)

[3] Statista. (Matchmaking). Retrieved from: https://www.statista.com/outlook/371/119/matchmaking/india (last accessed on 14th August, 2020)

a significant part of their wealth on the wedding ceremony of their children. (Seth, 2011). Therefore, the online matchmaking services in India differ significantly from that of other countries, making it a unique context for exploration.

The practices and rituals related to marriage may differ across the world depending upon the caste, creed, category, and religion of the individuals (Seth, 2011). These differences related to the traditions may lead to the differences in individuals' preferences for different characteristics in the matrimonial services. Valkenburg and Peter (2007) highlighted the differences in the posting behavior of different kinds of online daters and called for the modification of existing theories to incorporate the differences. Therefore, the current study attempts to understand the differences across different samples of users, so that the services can be customized accordingly. The parameters selected for segregating the user samples include gender and age.

The current study investigates three objectives: the first is to propose a framework for the quality evaluation of matrimonial websites. The second is to examine the relative importance of quality factors for different kinds of users, and the third is to evaluate the performance of various online platforms by using the proposed framework. The framework has been developed by integrating factors from the IS success model (Delone & Mclean, 2003) and the SMI framework (Ahuvia & Adelman, 1992), which provides the factors important for matrimonial service context. The extracted factors include system quality; information quality; service quality; and search, match, and interaction related features. The simultaneous presence of large numbers of qualitative factors in the model makes decision making complex, and MCDM approaches help to deal with this complexity (Cebi, 2013).

The proposed hybrid model includes the fuzzy AHP model for weights calculation and the EDAS, TOPSIS, and COPRAS models for website evaluation. Finally, the study compares the results obtained through the three different models used for ranking the websites.

The rest of paper is organized as follows: Section 2 describes the different strands of literature, and Section 3discusses the theoretical background of the study. Section 4 presents details about the preliminaries, and Section 5 presents the data collection process. The methodology and proposed model are discussed in Section 6. Section 7 explains the results and presents a discussion of the findings and last section presents concluding remarks and highlight future research directions.

LITERATURE REVIEW

Due to a paucity of time and the extensive reach of online media, people are looking at the possibilities of initiating a relationship. A variety of services such as online dating apps, matchmaking apps, matrimonial websites, etc. have emerged to fulfil these needs. Past research highlights the integration of these platforms into social life and the subsequent transformation of different aspects related to decision making (Sprecher, 2009). Researchers also argue about the association between the 'medialization' of the process and the change in attitude towards marriage and partner selection (Titzmann, 2013). Due to technology and media-rich platforms the decision-making process has been transformed to include the expectations of an individual as well as his or her family (Bhandari, 2018; Titzmann, 2013).

Researchers have also examined the characteristics and participation behaviors of individuals on these platforms. An individual's age and level of dating anxiety have been found to be the significant predictors of participation on these platforms (Valkenburg & Peter, 2007). People usually express their preferences for skin color and complexion of the potential partner (Mishra et al., 2013; Ramasubramanian & Jain, 2009). Males are more likely to state their preference for a light-skinned partner (Jha & Adelman, 2009) and announce their financial stability, while females are more likely to

announce the appearance of their complexions, along with other stereotypically feminine qualities (Ramasubramanian & Jain, 2009). The extant literature focuses mostly on the use and appropriation of these services in the social lives (Agrawal, 2015; Titzmann, 2011, 2013); changes in the notion of arranged marriages (Seth, 2011); and gender-specific differences (Chakraborty, 2012; Ramasubramanian & Jain, 2009).

In order to improve our understanding about technology-infused world, the stalwart researchers Orlikowski & Iacono (2001) have suggested to "engage deeply and seriously with the (IT) artifacts that constitutes a central component of that future" (p. 133); otherwise, they say, we might end up becoming passive observers of this transformation. This is true for the matchmaking industry as well. However, the literature discussed above highlights the socio-technical transformations happening around technology usage in the matchmaking industry. As demonstrated in Table 1, almost all of the studies examining matrimonial websites are qualitative in nature and conduct a content analysis of profiles, ads, or interviews. There is a lack of studies engaging deeply with the website as a central artifact in this whole phenomenon of matchmaking. The present study attempts to contribute by focusing on the website as a core component and proposing a framework to evaluate its quality.

Table 1. Studies Related to Matchmaking Websites

Author	Objective of the study	Methodology
Valkenburg & Peter (2007)	*Examines the demographic predictors of participation on the online dating services*	*Hierarchiccal regression*
Sprecher (2009)	*Focuses on the online relationship intiation*	*Literature Review*
Ramasubramanian & Jain (2009)	*Focuses on spousal expectations and role preferences based on gender*	*Content analysis*
Jha & Adelman (2009)	*Studies the preferences for the skincolor of the partner in Indian Matrimonial Websites*	*Content analysis*
Seth (2011)	*The role of matrimonial websites in the process of arranging marriages in India*	*Ethnography*
Titzmann (2011)	*Focuses on the construction and mediation processes of femininity*	
Chakraborty (2012)	*Studies the participation of young women in virtual heterosexual mate-seeking*	*Interviews*
Titzmann (2013)	*Studies the relationship between changes in matchmaking due to media and overall social change*	*Content analysis*
Mishra et al. (2013)	*Studies the practice of self-presentation in online matrimonial advertisements by focusing on Muslim men and women*	*Content analysis*
Agrawal (2015)	*Studies the role of new technology in enabling family and kin to engage in the search for a suitable match*	*Interviews*
Bajnaid (2016)	*Studies the impression formation, preferences for partners and courtship scripts among Saudi users*	*Content analysis and interviews*
Bhandari (2018)	*Argues that modern Indian marriages involve the equal consent from the family.*	*Ethnography*
Bajnaid & Elareshi (2018)	*Profile analysis of the matrimonial website users*	*Content analysis*
Present study	*Factors specific to the process of matchmaking, which include search, matching and interaction with potential partners, are important for the customers while evaluating the quality of matrimonial websites*	*MCDM model*

WEBSITE EVALUATION LITERATURE

In the platform business ecosystem, maintaining an effective website plays a significant role in keeping good relationship with customers (Massad et al., 2006).As in offline shopping, the customer experience attracts their attention (Gupta et al., 2020), the experience with website's features may enhance the purchase intentions, customer satisfaction and perceived reputation of the website owner (Chen et al., 2017; Kwak et al., 2019). Organizations have different web strategies to fulfil their objectives. For instance, a travel website acts as an information source and facilitates transactions (Law et al., 2010), while e-learning websites play a central role in enhancing the effectiveness of a course (Lin, 2010). A hotel website acts as a tool for promotion and telepresence (Ongsakul et al., 2020) and e-commerce websites may be used to signal product quality (Mavlanova et al., 2016). As these websites have different objectives to fulfil, a single framework of evaluation may not work for all of these websites. Hence, the effective quality evaluation of this medium by considering the specific business context becomes a matter of utmost importance.

As demonstrated in Table 2, the website quality evaluation has been extensively studied in varied contexts such as tourism, e-learning, online shopping and more. The majority of the studies focus on e-commerce websites and highlight the importance of the website's general features, such as navigation, ease of use, quality of information, and speed of service. E-commerce websites may be characterized by the presence of electronic trading, providing the capacity to buy or sell products and services (Gunasekaran et al., 2002). These websites are primarily focused on economic transactions driven by logic and rationality (Gopi & Ramayah, 2007). On the other hand, matchmaking websites are oriented towards connecting people and enabling them to develop emotional relationships (Sprecher, 2009). Therefore, it is crucial to incorporate context-specific factors influenced by human emotions into the evaluation model. Hence, the models developed for websites enabling transactions may not give reliable results for websites involving human relationships.

Table 2. Literature Related to Website Evaluation

Authors	Objective of the study	Website evaluated	Method used
Lee & Kozar (2006)	*Investigates relative importance of website quality factors and rank preferences for the websites*	*Travel and electronics product purchase websites*	*AHP*
Lin (2010)	*To develop an evaluation model for prioritizing the quality factors of a Course website.*	*Online Course websites*	*Fuzzy AHP*
Tsai, Chou & Lai (2010)	*To evaluate the quality of the national park websites*	*National Park websites*	*DEMATEL, ANP, VIKOR*
Chiou et al. (2011)	*To evaluate the effectiveness of travel websites*	*Travel websites*	
Cebi (2013)	*To assess the perceived design quality of websites and the interactions among different design characteristics*	*Online shopping websites*	*Fuzzy set theory, DEMATEL*
Bastida & Huan (2014)	*To construct a rubric consisting of the parameters used for tourism website comparison*	*Travel websites*	*Rubric of factors*
Akincilar & Dagdeviren (2014)	*To develop a model for quality evaluation of the hospital websites*	*Hotel Websites*	*AHP, PROMETHE*
Rouyendegh et al. (2019)	*To evaluate performance of e-commerce websites*	*E-commerce websites*	*AHP-IFT*
Present study	*Developed a framework to evaluate the quality of the matchmaking websites*	*Matrimonial websites*	*Fuzzy-AHP, EDAS, Revised TOPSIS, COPRAS*

As is evident from Table 2, several studies have attempted to identify the factors of website quality and success. There is a lack of studies focusing on the evaluation of the quality of websites meant for developing human relationships and matchmaking. Given the uniqueness of these websites, this study aims towards incorporating the emotion-driven, context-specific factors related to the matchmaking process into the final evaluation model.

THEORETICAL FRAMEWORK

With the emergence of the internet, websites have become the most frequently used IT artifact. The literature has a plethora of research related to different aspects of websites. DeLone and McLean (2003) model suggests that the quality of an information system is a multi-dimensional concept, broadly consisting of three types of cues such as system quality, information quality, and service quality (Delone & Mclean, 2003; Victor Chen et al., 2013). Each of the abovementioned quality factors comprise many sub-factors, described below (also, see Table 3).

SYSTEM QUALITY

System quality of a website may be defined as its perceived ability to deliver suitable functionality with respect to users' control (Delone & Mclean, 2003, 2004). Accessibility, navigability, usability, and privacy policy of the website have been identified as crucial sub-factors of system quality (Chou & Cheng, 2012).

INFORMATION QUALITY

It denotes the quality of the information or content provided by the websites (Delone & Mclean, 2003). The items identified to evaluate the information quality include the relevance of information for the user, understandability, richness of content and up-to-date information availability (Chou & Cheng, 2012).

SERVICE QUALITY

In the context of online websites, the service quality refers to the overall support delivered by the website (Delone & Mclean, 2004; Lin, 2010). The items identified to evaluate service quality are reliability, responsiveness, trust, and empathy (Lee & Kozar, 2006).

Table 3. Definition of the Sub-factors of Quality Parameters

Factors	Sub-Factors	Definition
System Quality	*Accessibility*	*Accessibility measures whether information can be accessed efficiently and whether the site can be located using standard resource discovery tools (Smith, 2001).*
	Navigability	*Navigability measures the easiness of accessing the required information on the website, the menu structure, page design and links on the website (Schmidt et al., 2008).*
	Usability	*Usability is a quality or attribute that represents how easy it is for a user to learn to use the website and how quick these are in helping users to accomplish the tasks (Chou & Cheng, 2012; Lee & Kozar, 2012).*
	Privacy	*Privacy denotes the extent to which users' privacy rights are protected, the disclosure about the privacy rights of users and whether the information exchange with users is encrypted (Smith, 2001).*
Information Quality	*Relevance*	*Relevance refers to the amount of relatedness of the information displayed on the website and information needs of the user (Chou & Cheng, 2012).*
	Understandability	*Understandability refers to easy to comprehend and read, and clarity of the meaning of information (Lee & Kozar, 2006).*
	Richness	*Richness refers to the level of details and range of information available on the website (Bilsel et al., 2006).*
	Currency	*Currency stands for up-to-date content. The dates of update o review may act as a useful indicator of the currency (Smith, 2001).*
Service Quality	*Responsiveness*	*Responsiveness deals with the willingness of helping the customers online and provide prompt service in solving the problems (Lee & Kozar, 2006).*
	Reliability	*Reliability involves the website's ability to deliver the promised performance consistently and accurately. It denotes the credibility and dependability of the website for service (Lee & Kozar, 2006).*
	Assurance	*Assurance implies that the workforce working behind the system have the knowledge to do the job well (Delone & Mclean, 2003).*
	Empathy	*Empathy refers to the extent of the care, attention, and customization provided to the users keeping the best interests of the user in mind (Chou & Cheng, 2012).*

CONTEXT-SPECIFIC FACTORS

Matrimonial websites act as intermediaries between two parties looking for an appropriate match. Ahuvia and Adelman (1992) proposed a framework called search match interaction (SMI), which categorizes the process involved in the marriage market to better understand the roles of intermediaries. This framework helps in integrating the context of relationship dyads and interpersonal interactions driven by emotions (Seth, 2011) in the final model. These factors are described below.

SEARCH

Search implies the process of information gathering. As categorized by Seth (2011), the search features provided by the websites include search based on religion, caste, culture, region, complexion and body type, income, and lifestyle of an individual. These features show that the design of these websites is highly linked to the traditional values and preferences of the individuals.

MATCHING

Matrimonial websites help in the process of matching by suggesting potential matches to a person based on his or her previous searches or requirements. Another notable feature provided is the simultaneous pursuit of multiple matches.

INTERACTION

These websites facilitate interaction among individuals through services such as chatting, sharing contact numbers, etc. (Seth, 2011). The availability of such services has enhanced the level of involvement of the individuals in decisions related to their potential marriage.

Table 4. List of Sub-factors Related to Matrimonial Websites

Search	Matching	Interaction
Religion and social background search	*Filtering option availability*	*Built-in chat service*
Lifestyle and work-related search	*Suggestions made by intermediaries*	*Phone and email address sharing*
Body type and complexion-based search	*Pursuing multiple matches simultaneously*	

All of these factors and sub-factors obtained after combining the two frameworks (see Table 3 and Table 4) are the non-economic benefits acquired from the matchmaking websites. The use or preference for certain features is influenced by emotions. However, in order to systematically compare the quality of the available options, it is crucial to incorporate the cost incurred in gaining these benefits. In the matchmaking context, users pay a fee for availing themselves of these services, which differ across platforms. Therefore, for better comparison of website quality, the current study includes the price paid for services in the final framework.

PRELIMINARIES

The framework proposed through the current study includes 8 criteria and 22 sub-criteria for evaluation of the websites. In order to handle such large number of factors, the decision-making literature provides a special approach called multi-criteria decision making (MCDM) (Roy, 1990). There is a plethora of MCDM approaches used in the literature; however, the analytical hierarchy process (AHP) proposed by Saaty (1988) is among the most frequently used approaches. In the study, a fuzzy AHP has been used to compute the relative weights of the criteria used for evaluation. As the objective of the current study is to identify the relative importance of one factor over another, and it aims at capturing the consumer's perspective about the factors enhancing website quality, authors find the Fuzzy-AHP approach more relevant than other MCDM approaches. Then, three different models—EDAS, TOPSIS, and COPRAS—have been used to rank the matrimonial websites by evaluating their performance on the selected criteria. Out of these, EDAS is a comparatively newer method which needs to be validated in different scenarios. Hence, for comparison, TOPSIS as one of the most frequently used methods and COPRAS as one of the basic additive models have been selected.

FUZZY AHP

The analytical hierarchy process is a multi-criteria decision-making approach used for making complex decisions. This process comprises three principles namely, decomposition, comparative judgment, and priority construction (Saaty, 1988, 1990). Decomposition involves the hierarchical representation of the problem where overall goal, criteria, and sub-criteria used for evaluation and decision alternatives form the levels of hierarchy. The criteria present at the same level of the hierarchy are subjected to the pairwise comparisons. Then, the relative weight of each factor is calculated to find its contribution towards the overall goal.

The traditional AHP uses a deterministic and crisp scale to compare the factors. However, the real-life decisions are not always crisp and straight. In order to handle the vagueness of such decisions, the crisp scale was modified based on fuzzy numbers (Chang, 1996; Murtaza, 2003). In the modified method, the pairwise comparisons are expressed by using the Triangular Fuzzy numbers (TFNs) which are represented as (l, m, u) where $l \leq m \leq u$ for a fuzzy event. The TFN linguistic scale utilized in the current study is as shown in Table 5.

Table 5. Fuzzy Linguistic Scale

Linguistic Scale	TFNs	Reciprocal TFNs
Equally important	*(1,1,1)*	*(1,1,1)*
Weakly more important	*(2/3,1,3/2)*	*(2/3,1,3/2)*
Strong more important	*(3/2,2,5/2)*	*(2/5,1/2,2/3)*
Very strong more important	*(5/2,3,7/2)*	*(2/7,1/3,2/7)*
Absolutely more important	*(7/2,4,9/2)*	*(2/9,1/4,2/7)*

EVALUATION BASED ON DISTANCE FROM AVERAGE SOLUTION (EDAS)

EDAS is one of the recent MCDM approaches proposed by (Keshavarz Ghorabaee et al., 2015) for selecting the best alternative among the compared options. A variety of similar approaches such as TOPSIS and VIKOR have been used in the literature, however, EDAS proves helpful in the situations involving conflicting criteria. On one hand, TOPSIS and VIKOR work on the basis of calculating the distance from positive and negative ideal solutions, while EDAS evaluates the best alternative on the basis of its distance from average solution. The method exhibits good stability even after changing the weights of criteria. It measures the positive and negative distances (PDA and NDA) from the average solution to find the difference between each alternative and the average. The alternative having a higher value of PDA and lower value of NDA present a better solution as compared to the average solution. The calculation steps are provided in Appendix 1.

REVISED TOPSIS (TECHNIQUE FOR ORDER OF PREFERENCE BY SIMILARITY TO IDEAL SOLUTION)

TOPSIS is among the frequently used MCDM methods for evaluating the alternatives based on their performance on selected criteria. These criteria may involve both beneficial and cost criteria simultaneously. The method was initially proposed by Hwang and Yoon (1981) to evaluate the alternatives based on their Euclidean distance from the positive and negative ideal solutions. The optimal alternative should be the nearest to positive ideal solution (PIS) and the farthest from negative ideal solution (NIS). The traditional TOPSIS does not pays attention to the relative importance of the distance from the PIS and NIS. It implicitly assumes both the distances to be equally important, however, this may limit the applicability of this method in real life decision making (Kuo, 2017). The decision makers may prefer the distance from PIS over the distance from NIS or vice versa. Therefore, Kuo (2017) suggested the improved version of TOPSIS by incorporating the relative importance of these two kinds of distances in the final calculation of ranks. The calculations steps followed in this new version are described in Appendix 1.

COPRAS (COMPLEX PROPORTIONAL ASSESSMENT)

Another widely used MCDM approach is Complex Proportional Assessment (COPRAS) proposed by Zavadskas, Kaklauskas, & Sarka (1994). The approach works in a similar way as that of SAW (Simple Additive Weighting). The SAW method can only include benefit criteria and the cost criteria are also required to be converted into benefit criteria before use. However, COPRAS alleviate this limitation of SAW and allows for the inclusion of both kinds of criteria into one matrix. These values are normalized before consideration so that the variables with different units can be used. The calculation steps are mentioned in Appendix 1.

DATA COLLECTION

The users of matrimonial website constitute the target population for the current study because these individuals get directly affected through the services of websites. The data for the present study has been collected by employing a survey questionnaire. The questionnaire comprised of two sections, each corresponding to the MCDM approaches used. The first section contained the pairwise comparisons of the factors in line with the Fuzzy AHP evaluation, while the second section consisted of alternative evaluation questions corresponding to the ranking methods. The sample involves 300 matrimonial website users belonging to different geographical regions, age groups, and gender. Out of the total sample, there were 171 male and 129 female respondents. Almost 64 percent of the respondents were aged between 30-50 years. The respondents recruited for the study were on the different stages of using the matrimonial websites. Some of the respondents have found a match while others were exploring the possibilities. Table 6 presents the demographic information of the respondents.

Table 6. Sample Demographics

Gender	Number	Percentage
Males	*171*	*57*
Females	*129*	*43*
Age		
<30 years	*109*	*36.3*
30-50 years	*191*	*63.7*
Area of residence		
Urban	*226*	*75.3*
Rural	*31*	*10.3*
Semi-Urban	*43*	*14.3*
Stage of usage		
Exploring	*101*	*33.7*
Found match	*193*	*64.3*
stopped using	*6*	*2*
Total Respondents	*300*	

PROPOSED MODEL

The current study proposes a hybrid model for evaluation of matrimonial websites consisting of three phases, as shown in Figure 1. The goal of the proposed model is to identify the relative importance of different factors contributing towards website quality and then rank matrimonial websites based on their performance on those parameters. In order to demonstrate the applicability of the evaluation framework on an array of matrimonial websites, five websites — www.shaadi.com, www.jeevansathi.com, www.bharatmatrimony.com, www.matrimonialsindia.com, and www.iitiimshaadi.com — have been selected. Some of these are the earliest entrants into the online matchmaking industry in India, while others are newcomers.

Shaadi.com, founded in 1996 by Anupam Mittal, claims to be the world's largest matrimonial website.[4] Bharatmatrimony.com, founded in 1997 by Murugavel Janakiraman, was named by Limca Book of Records to have the highest number of documented marriages.[5] Jeevansathi.com was started in 1998 and provides various exclusive privacy options for its users.[6] Matrimonialsindia.com, established in 1997[7], has a wide database of profiles and provides search facility based on caste, religion, community, state, etc. These websites are among the oldest players in the market. Another site, iitiimshaadi.com, is a special kind of matrimonial website started in 2014 by Taksh Gupta.[8] It enables the graduates of the premier institutions of India, such as IITs and IIMs, to look for partners with similar qualifications and other criteria, such as a tolerance for late working hours and frequent relocation. These websites provide a better perspective of the overall market in India.

Customers of matrimonial services usually register on multiple websites in order to test them, but finally purchase a service package from just one or two providers. For making the final purchase decision, users make certain cognitive evaluations regarding the service providers. In order to take this into account, users were asked to fill in the responses with respect to their most preferred platform. The application of the proposed model is described in the following sub-sections.

APPLICATION OF PROPOSED MODEL

PHASE 1 – IDENTIFY CRITERIA

As discussed in the above section, the criteria selected for the study include system quality (SyQ), information quality (IQ), service quality (SrQ), search options, matching options, and interaction. All these criteria are the beneficial criteria, because a higher extent of these factors is desired. The price of the services provided by the websites has been included to incorporate the cost incurred. In addition, the registration process for the matrimonial websites has been found to be very lengthy and cumbersome. Users have been found to face problems while completing this process. Therefore, an additional factor called 'ease of registration process' has been included in the final framework. Six out of these eight factors consist of corresponding sub-factors, as described in Table 3 and Table 4.A four-level decision hierarchy including the goal, factors, sub-factors, and the websites is shown in Figure 2.

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[5] Bharatmatrimony.com. Retrieved from: https://www.bharatmatrimony.com/media/moneycontrol-limca-book-of-records.html (last accessed on 14th August, 2020)
[6] Jeevansathi. Retrieved from: https://www.jeevansathi.com/ (last accessed on 14th August, 2020).
[7] Matrimonialsindia. Retrieved from: https://www.matrimonialsindia.com/ (last accessed on 14th August, 2020).
[8] Iitiimshaadi. Retrieved from: https://iitiimshaadi.com/ (last accessed on 14th August, 2020).

PHASE 2 – RELATIVE WEIGHTS OF THE FACTORS

In this phase, responses to the questionnaire were collected from the users of matrimonial websites. All the responses were combined to obtain a single matrix of pairwise comparison of the factors, as shown in Table 7. For combining the responses, the geometric mean method proposed by Buckley (1984) was used.

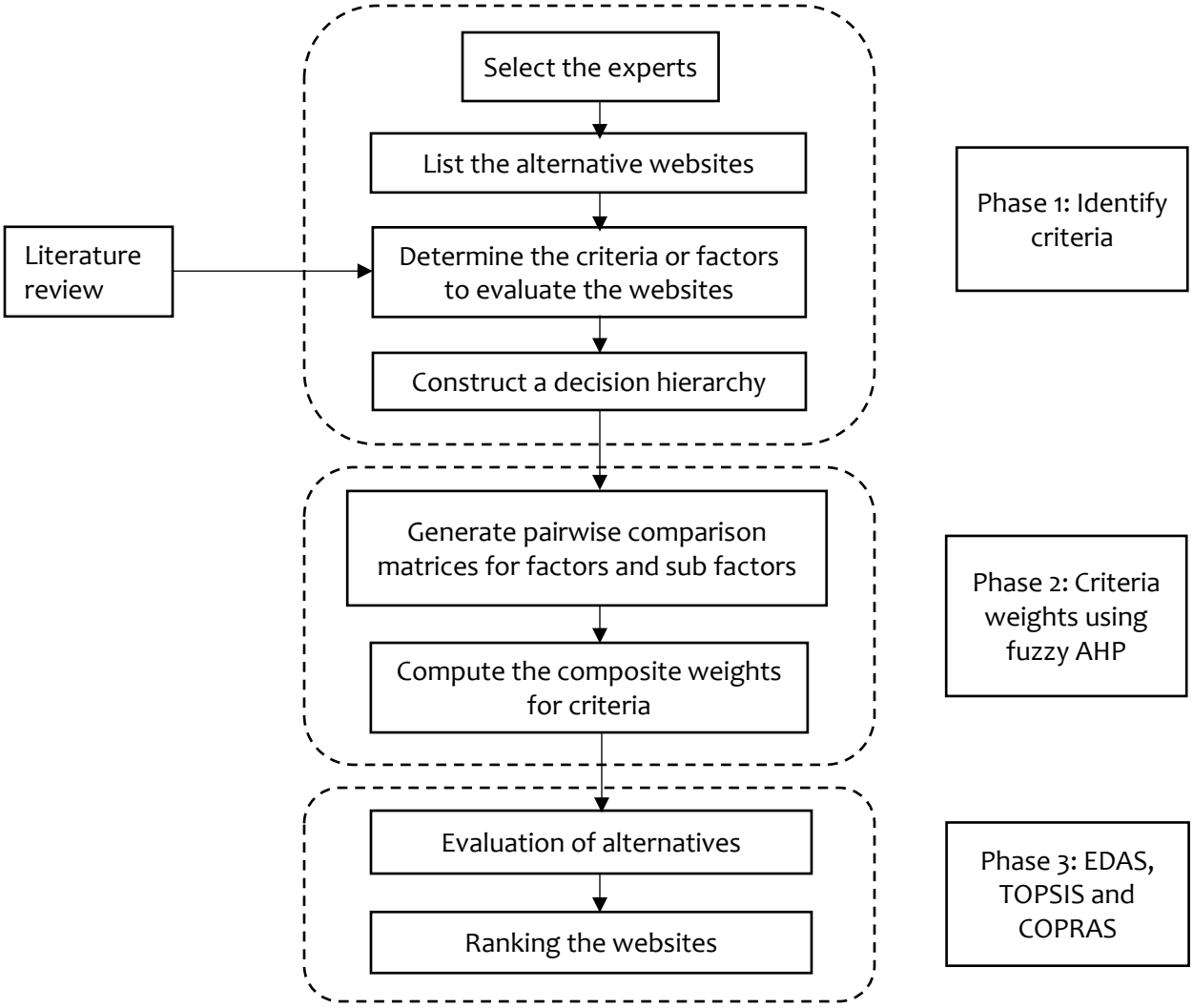

Figure 1. Proposed Model

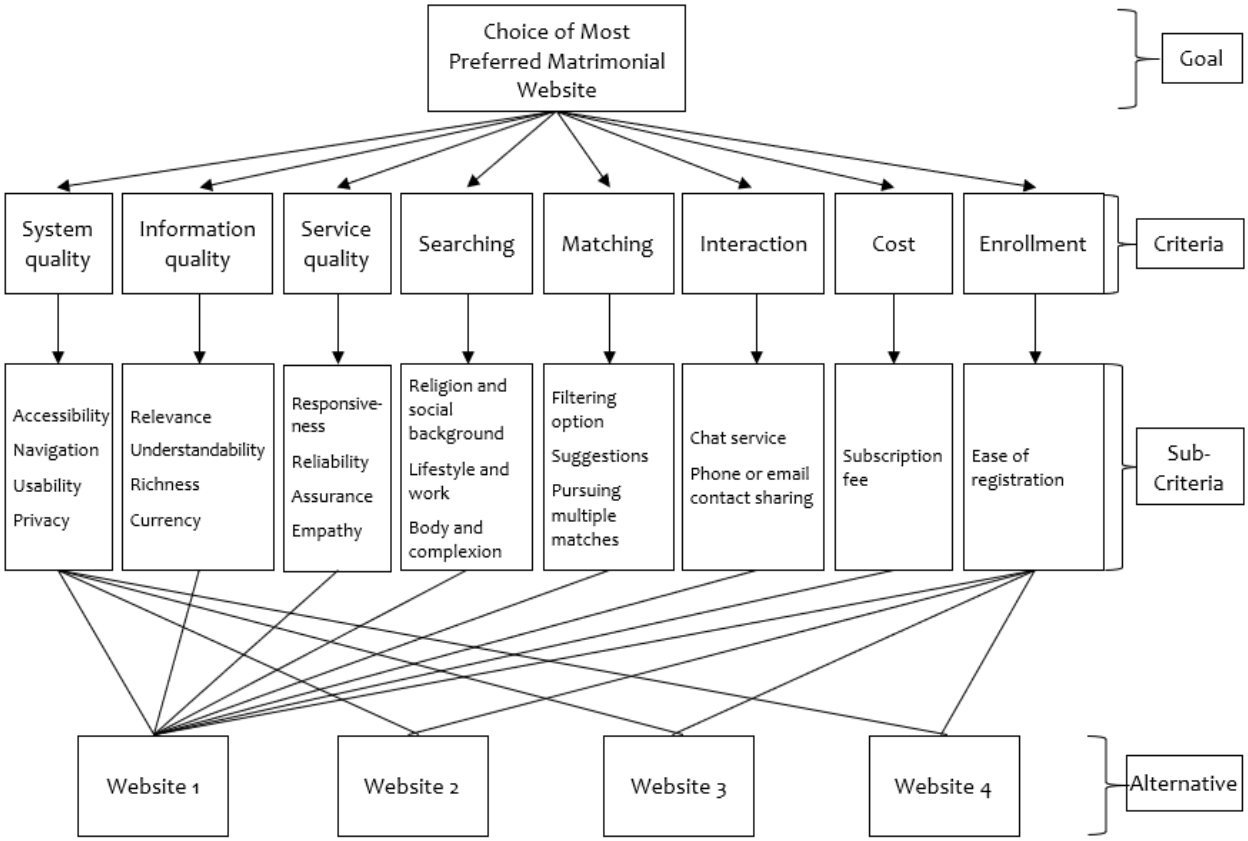

Figure 2. Hierarchical Model of Evaluation

The results obtained from the pairwise comparison matrix are presented in Table 8, where the last column indicates relative weights of the factors. The results indicate that the search- and match-related options have the highest weights, while interaction and registration process have the lowest weights. This shows that matrimonial website users perceive context-specific features related to searching and matchmaking as more important than overall website quality parameters. Therefore, it is crucial to consider the fulfilment of the needs of the users while evaluating the overall quality of the platform. The price of the subscription packages is also an important factor for users, followed by website quality parameters.

In order to gain deeper insights related to user behavior and preferences, the sample was further divided on the basis of the gender and age of the individuals. Table 9 represents pairwise comparison matrix obtained from female respondents. Table 10 and Table 11 present the relative weights of the factors for females and males, respectively. Both males and females weigh the search and matchmaking options as the most preferred factors, but the difference has been observed in preference for the price of services (Figure 3). Male users prefer service quality, but the weight assigned to all quality factors are almost similar. However, the females weigh the quality of information more than other two kinds of quality parameters.

Each of the criteria comprises a number of sub-factors and users may exhibit varied preferences for each of these constituting factors. Therefore, the pairwise comparison matrices for all the sub-factors were constructed to calculate their relative contribution towards the main factors. Table 12 presents the results of the relative weights of all the sub-factors for the complete sample, both male and female respondents. The comparison of these relative weights (as shown in Figure 4) reveals that the majority of the sub-factors have almost similar weights across the different samples of respondents; however, a few important differences have been observed. As compared to males, females have been observed to prefer the updation of information displayed on the websites and place less weightage on the relevance of information. On the other hand, male respondents prefer the search options based on the body type and complexion of the individuals and a built-in chat option for interacting, while females prefer phone or mail contact information sharing for interaction with the probable candidate. It clearly indicates that even though the users prefer search and matchmaking factors, they still have different preferences for the corresponding constituting sub-factors.

Table 7. Fuzzy Evaluation Matrix for the Weights

	SyQ	IQ	SrQ	Search	Match	Interaction	Price	Registration
SyQ	(1, 1, 1)	(0.83, 0.99, 1.17)	(0.86, 1.03, 1.23)	(0.76, 0.89, 1.05)	(0.77, 0.91, 1.08)	(0.88, 1.05, 1.24)	(0.86, 1.01, 1.20)	(0.87, 1.03, 1.23)
IQ	(0.85, 1.01, 1.20)	(1, 1, 1)	(0.86, 1.02, 1.21)	(0.74, 0.88, 1.05)	(0.83, 0.98, 1.17)	(0.86, 1.02, 1.21)	(0.86, 1.02, 1.20)	(0.86, 1.02, 1.20)
SrQ	(0.81, 0.97, 1.16)	(0.83, 0.98, 1.17)	(1, 1, 1)	(0.80, 0.95, 1.12)	(0.82, 0.97, 1.15)	(0.86, 1.02, 1.21)	(0.84, 0.99, 1.17)	(0.83, 0.98, 1.16)
Search	(0.95, 1.12, 1.32)	(0.95, 1.13, 1.34)	(0.89, 1.06, 1.25)	(1, 1, 1)	(0.89, 1.05, 1.24)	(0.92, 1.09, 1.28)	(0.94, 1.12, 1.33)	(0.91, 1.08, 1.28)
Match	(0.92, 1.10, 1.30)	(0.86, 1.02, 1.20)	(0.87, 1.03, 1.22)	(0.80, 0.95, 1.12)	(1, 1, 1)	(0.89, 1.05, 1.24)	(0.83, 0.98, 1.15)	(0.97, 1.16, 1.37)
Interaction	(0.80, 0.95, 1.13)	(0.83, 0.98, 1.16)	(0.83, 0.98, 1.16)	(0.78, 0.92, 1.08)	(0.80, 0.95, 1.13)	(1, 1, 1)	(0.82, 0.97, 1.14)	(0.83, 0.97, 1.15)
Price	(0.84, 0.99, 1.17)	(0.83, 0.98, 1.16)	(0.85, 1.01, 1.19)	(0.75, 0.89, 1.06)	(0.87, 1.02, 1.20)	(0.88, 1.03, 1.21)	(1, 1, 1)	(0.80, 0.94, 1.11)
Registration	(0.82, 0.97, 1.15)	(0.83, 0.98, 1.16)	(0.86, 1.02, 1.20)	(0.78, 0.92, 1.10)	(0.73, 0.87, 1.03)	(0.87, 1.03, 1.21)	(0.90, 1.06, 1.24)	(1, 1, 1)

Table 8. Relative Weights Obtained through Fuzzy AHP

Criteria	S_i	$w'(S_i)$	W
SyQ	(0.09, 0.12, 0.17)	0.852124	0.137716
IQ	(0.09, 0.12, 0.17)	0.86048	0.139067
SrQ	(0.09, 0.12, 0.16)	0.83872	0.13555
Search	(0.10, 0.13, 0.18)	1	0.161615
Match	(0.10, 0.13, 0.17)	0.92592	0.149643
Interaction	(0.09, 0.12, 0.16)	0.430638	0.069598
Price	(0.09, 0.12, 0.16)	0.839832	0.13573
Registration	(0.09, 0.12, 0.16)	0.439819	0.071081

Table 9. Comparison Matrix for Female Respondents

	SyQ	IQ	SrQ	Search	Match	Interaction	Price	Registration
SyQ	(1, 1, 1)	(0.73, 0.87, 1.04)	(0.87, 1.04, 1.24)	(0.76, 0.91, 1.08)	(0.80, 0.94, 1.12)	(0.89, 1.05, 1.25)	(0.84, 1.00, 1.18)	(0.86, 1.03, 1.22)
IQ	(0.96, 1.15, 1.36)	(1, 1, 1)	(0.85, 1.01, 1.20)	(0.75, 0.90, 1.08)	(0.77, 0.92, 1.10)	(0.84, 1.00, 1.18)	(0.84, 1.00, 1.19)	(0.84, 1.00, 1.19)
SrQ	(0.80, 0.96, 1.15)	(0.83, 0.99, 1.18)	(1, 1, 1)	(0.77, 0.92, 1.10)	(0.77, 0.91, 1.09)	(0.79, 0.93, 1.11)	(0.80, 0.95, 1.13)	(0.81, 0.96, 1.15)
Search	(0.92, 1.10, 1.31)	(0.93, 1.11, 1.33)	(0.91, 1.08, 1.29)	(1, 1, 1)	(0.85, 1.01, 1.20)	(0.87, 1.04, 1.24)	(0.91, 1.10, 1.32)	(0.91, 1.10, 1.32)
Match	(0.89, 1.06, 1.25)	(0.91, 1.09, 1.30)	(0.92, 1.09, 1.30)	(0.83, 0.99, 1.18)	(1, 1, 1)	(0.96, 1.15, 1.37)	(0.81, 0.96, 1.15)	(0.87, 1.05, 1.26)
Interaction	(0.80, 0.95, 1.13)	(0.85, 1.00, 1.20)	(0.90, 1.07, 1.27)	(0.81, 0.96, 1.14)	(0.73, 0.87, 1.05)	(1, 1, 1)	(0.81, 0.96, 1.14)	(0.83, 0.98, 1.17)
Price	(0.85, 1.00, 1.19)	(0.84, 1.00, 1.19)	(0.89, 1.05, 1.25)	(0.76, 0.91, 1.09)	(0.87, 1.04, 1.24)	(0.88, 1.04, 1.23)	(1, 1, 1)	(0.82, 0.98, 1.16)
Registration	(0.82, 0.98, 1.16)	(0.84, 1.00, 1.18)	(0.87, 1.04, 1.23)	(0.76, 0.91, 1.10)	(0.79, 0.95, 1.15)	(0.85, 1.02, 1.21)	(0.86, 1.02, 1.22)	(1, 1, 1)

Table 10. Relative Weights of the Factors (for females)

Criteria	S_i	$w'(S_i)$	W
SyQ	(0.090, 0.122, 0.166)	0.44979739	0.081391883
IQ	(0.092, 0.124, 0.169)	0.888528885	0.160781367
SrQ	(0.088, 0.119, 0.162)	0.427446457	0.07734743
Search	(0.098, 0.133, 0.182)	1	0.180952324
Match	(0.096, 0.131, 0.178)	0.970638409	0.175639276
Interaction	(0.090, 0.122, 0.165)	0.445359724	0.080588877
Price	(0.092, 0.125, 0.170)	0.898300189	0.162549507
Registration	(0.091, 0.123, 0.168)	0.446246483	0.080749338

Table 11. Relative Weights of Factors (for males)

Criteria	S_i	$w'(S_i)$	W
SyQ	(0.093, 0.124, 0.166)	0.846583	0.1390
IQ	(0.093, 0.124, 0.166)	0.844419	0.1386
SrQ	(0.094, 0.125, 0.167)	0.856784	0.1407
Search	(0.102, 0.136, 0.181)	1	0.1642
Match	(0.096, 0.128, 0.170)	0.894181	0.1468
Interaction	(0.090, 0.120, 0.159)	0.418105	0.0686
Price	(0.091, 0.121, 0.160)	0.425459	0.0699
Registration	(0.092, 0.122, 0.162)	0.80506	0.1322

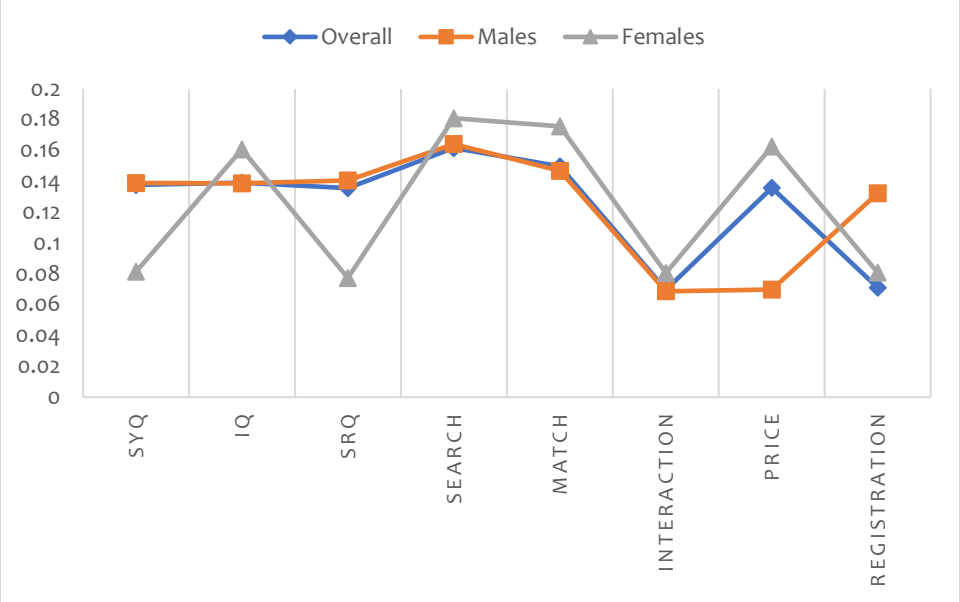

Figure 3. Comparison of Males and Females

Table 12. Relative Weights of the Sub-factors

		Local weights of sub-factors			**Global Weights of sub-factors**		
Factors	**Sub-factors**	Overall sample	Males	Females	Overall sample	Males	Females
SyQ	*Accessibility*	*0.225*	*0.238*	*0.206*	*0.031*	*0.033*	*0.0167*
	Navigability	*0.252*	*0.250*	*0.255*	*0.035*	*0.035*	*0.0208*
	Usability	*0.264*	*0.257*	*0.273*	*0.036*	*0.036*	*0.0223*
	Privacy	*0.259*	*0.255*	*0.266*	*0.036*	*0.035*	*0.0216*
IQ	*Relevance*	*0.217*	*0.243*	*0.173*	*0.030*	*0.034*	*0.0279*
	Understandability	*0.239*	*0.248*	*0.223*	*0.033*	*0.034*	*0.0358*
	Richness	*0.274*	*0.269*	*0.287*	*0.038*	*0.037*	*0.0461*
	Up to date	*0.270*	*0.2405*	*0.317*	*0.038*	*0.033*	*0.0509*
SrQ	*Speed*	*0.248*	*0.232*	*0.267*	*0.034*	*0.033*	*0.0207*
	Reliability	*0.258*	*0.257*	*0.259*	*0.035*	*0.036*	*0.0200*
	Trust	*0.264*	*0.268*	*0.260*	*0.036*	*0.038*	*0.0201*
	Empathy	*0.231*	*0.243*	*0.214*	*0.031*	*0.034*	*0.0165*
Search	*Religion*	*0.318*	*0.308*	*0.328*	*0.051*	*0.051*	*0.0593*
	Lifestyle	*0.326*	*0.320*	*0.333*	*0.053*	*0.053*	*0.0602*
	Body type	*0.356*	*0.371*	*0.339*	*0.058*	*0.061*	*0.0614*
Match	*Filtered match*	*0.316*	*0.323*	*0.306*	*0.047*	*0.047*	*0.0538*
	Suggestions	*0.339*	*0.336*	*0.343*	*0.051*	*0.049*	*0.0603*
	Multiple matches	*0.345*	*0.341*	*0.350*	*0.052*	*0.050*	*0.0615*
Interaction	*Chat*	*0.458*	*0.514*	*0.365*	*0.032*	*0.035*	*0.0294*
	Contact details	*0.542*	*0.486*	*0.634*	*0.038*	*0.033*	*0.0511*

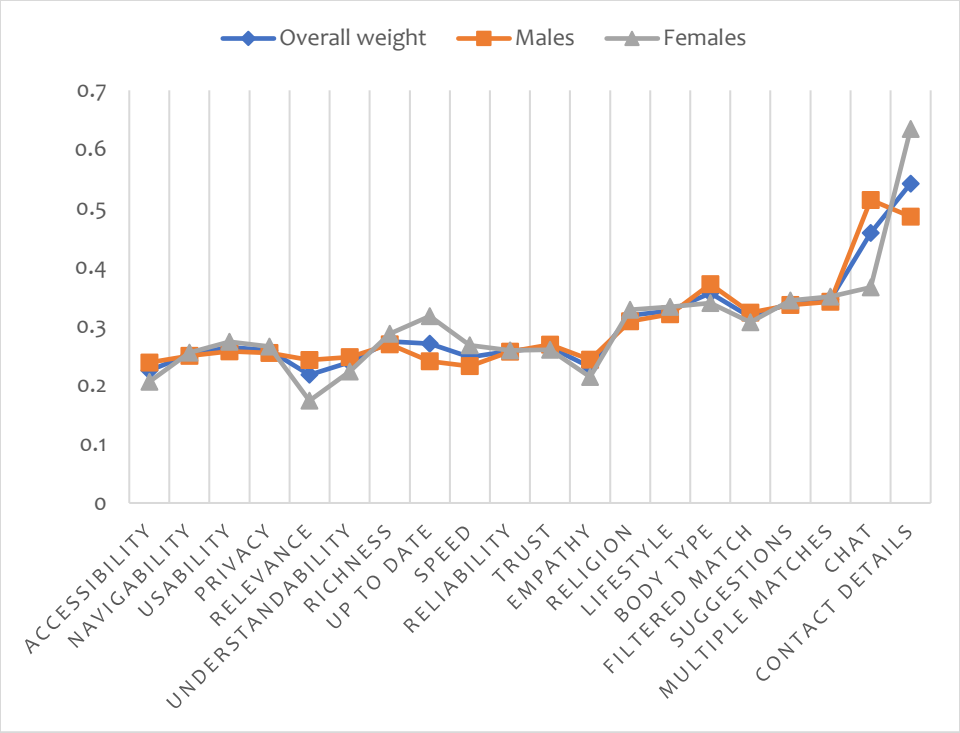

Figure 4. Comparison of the Sub-factor Weights

Table 13. Relative Weights of the Factors for Respondents Aged Less than 30 Years

Criteria	S_i	$w'(S_i)$	W
SyQ	(0.092,0.123,0.165)	0.862772	0.136784
IQ	(0.095,0.127,0.170)	0.919987	0.145855
SrQ	(0.091,0.122,0.164)	0.8495	0.13468
Search	(0.099,0.133,0.179)	1	0.158541
Match	(0.097,0.130,0.174)	0.950245	0.150652
Interaction	(0.091,0.121,0.162)	0.438548	0.069528
Price	(0.092,0.122,0.163)	0.847418	0.13435
Registration	(0.091,0.122,0.163)	0.439065	0.06961

For further analysis, the sample of respondents was divided into two age groups. The first group involves the users under the age of 30 years and the second group includes respondents from 30 to 50 years old. Pairwise comparison matrices were constructed for both the samples, and calculations were performed to obtain the final weights of the factors. Table 13 and Table 14 demonstrate the relative weights of the factors for the users aged less than 30 years and those between 30 and 50 years, respectively. The comparison shown in Figure 5 illustrates that the younger individuals place more weight on the quality parameters of the website. The second group places more weightage on the search and matchmaking options. The first group of users has been found to be more worried about the price of the services, while the second group wants an easy registration process over these websites.

Table 14. Relative Weights of the Factors for Respondents Aged Between 30-50 Years

Criteria	S_i	$w'(S_i)$	W
SyQ	*(0.092,0.124,0.167)*	*0.859379*	*0.160126*
IQ	*(0.090,0.122,0.164)*	*0.430592*	*0.080231*
SrQ	*(0.090,0.122,0.164)*	*0.431652*	*0.080429*
Search	*(0.100,0.135,0.182)*	*1*	*0.186327*
Match	*(0.096,0.129,0.174)*	*0.924548*	*0.172269*
Interaction	*(0.090,0.120,0.162)*	*0.419513*	*0.078167*
Price	*(0.092,0.124,0.166)*	*0.44372*	*0.082677*
Registration	*(0.092,0.124,0.166)*	*0.857498*	*0.159775*

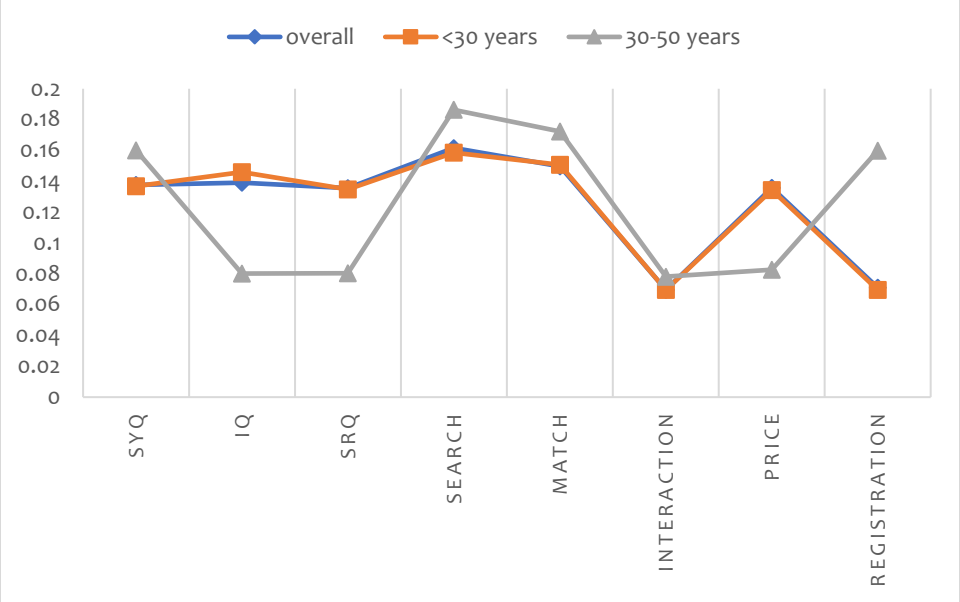

Figure 5. Comparison of Different Age Groups

Phase 3 – Ranking the Websites

Most of the criteria selected for the evaluation of the websites are subjective in nature, such as the accessibility of the website, the relevance of the content, etc. It was difficult to find objective measures of these criteria in order to compare the performance of different websites. Therefore, the experienced users of these websites were asked to rate the performance of the websites on the selected criteria. As it is highly unlikely for a user to use all the five websites, the participants were asked to rate the performance of the websites they had actually used. Table 15 indicates the number of respondents using each website out of the total sample of 300 respondents. The total number of users outnumbers the number of respondents because several respondents had used more than one website.

Table 15. Number of Respondents Using Respective Websites

Website	No. of users
Shaadi (SH)	*93*
Jeevansathi (JS)	*133*
Bharatmatrimony (BM)	*90*
Matrimonials India (MI)	*40*
Iitiimshaadi (IIS)	*17*

EDAS

Out of all the criteria, the price of the service is a non-beneficial criterion, while the rest are beneficial criteria. After categorizing, all the criteria were assigned the weights obtained through the fuzzy AHP in the previous step. In order to construct the evaluation matrix, the arithmetic mean of the ratings assigned by the users was considered, while the price was taken as an absolute value. Considering the type of criteria, the PDA and NDA were computed. Then, the weighted sum product of the PDA and NDA was computed for all the alternatives. After normalizing the weighted scores, the final appraisal score (AS*i*) was calculated to rank the alternatives. After considering all the parameters, alternative 2 (A2) ranks the highest, making it the best choice. Then comes A1, followed by A4 (Table 16). These are the results of the model for only one combination of the weights of the criteria and sub-criteria.

Table 16. EDAS results for complete sample of respondents

Alternatives	SP_i	NSP_i	SN_i	NSN_i	AS_i
A1 (SH)	*0.0666*	*0.7126*	*0.0275*	*0.8475*	*0.7801*
A2 (JS)	*0.0934*	*1*	*0.0234*	*0.8705*	*0.9352*
A3 (BM)	*0.0181*	*0.1939*	*0.0257*	*0.8579*	*0.5259*
A4 (MI)	*0.0191*	*0.2047*	*0.0083*	*0.9537*	*0.5792*
A5 (IIS)	*0.0684*	*0.7321*	*0.1806*	*0*	*0.366*

TOPSIS

The same decision matrix as that for the EDAS was used for the calculations of the TOPSIS method. Based on the beneficial and non-beneficial criteria, the PIS and NIS were calculated through the weighted normalized decision matrix. As these ideal solutions represent the hypothetical scenario, the distance of each alternative from these extremes was calculated (Di+ and Di-). Based upon these distances, the relative closeness index, RCi, was computed to finally rank these alternatives. As the revised TOPSIS has been used for the final calculations of ranks, different weights (w+ and w-) were assigned to the separations from the PIS and NIS. The results, indicated in Table 17, show that the second alternative, A2, performs the best, followed by A1. This model was tested for 10 different combinations of weight ranging from 0.1 to 0.9, and the rankings of the alternatives remained the same. Therefore, only the calculations corresponding to the w+=w-=0.5 have been reported in Table 17.

Table 17. TOPSIS Results for Complete Sample of Respondents

Alternatives	D_{i+}	D_{i-}	$\frac{D_{i+}}{\sum D_{i+}}$	$\frac{D_{i-}}{\sum D_{i-}}$	RC_i
A1(SH)	*0.0140*	*0.0900*	*0.0076*	*0.2366*	*0.0936*
A2 (JS)	*0.0100*	*0.0996*	*0.0054*	*0.2618*	*0.1183*
A3 (BM)	*0.030*	*0.0715*	*0.0162*	*0.1880*	*0.0234*
A4 (MI)	*0.031*	*0.0696*	*0.0168*	*0.1831*	*0.0176*
A5 (IIS)	*0.099*	*0.0116*	*0.0540*	*0.0305*	*-0.2530*

COPRAS

After creating the set of beneficial and non-beneficial criteria in the decision matrix, the weighted normalized sums, S+*j* and S-*j*, were calculated. The relative significance of the alternatives, Q*j*, was calculated on the basis of these sums, which led to the final rankings of the alternatives. The results indicated that alternative A2 is the best performing choice, followed by A1 (Table 18).

Table 18. COPRAS Results for Complete Sample of Respondents

Alternatives	S_{+j}	S_{-j}	Q_j	N_j
A1 (SH)	*0.167424*	*0.014077*	*0.20178*	*0.904827*
A2 (JS)	*0.168403*	*0.008857*	*0.223004*	*1*
A3 (BM)	*0.168229*	*0.024199*	*0.188214*	*0.843994*
A4 (MI)	*0.172993*	*0.0253*	*0.192108*	*0.861458*
A5 (IIS)	*0.186359*	*0.063266*	*0.194003*	*0.869954*

The rankings of the last three alternatives calculated through COPRAS differ from those of EDAS and TOPSIS (Table 19). The alternative that ranked last in both EDAS and TOPSIS, ranks third as per the COPRAS method. These are the results calculated on the basis of the weights of the criteria obtained through FAHP in the second phase of the model. However, in order to check the stability of the results, these three ranking models were computed for different combinations of criteria weights. The

different combinations of the weights were generated by changing the weights of these criteria individually by 5 percent and 50 percent. Even after changing the weights by 50 percent, the rankings of the alternatives did not change much for all the ranking models. This indicates the stability of the ranking based on the weights calculated through FAHP. Further, a sensitivity analysis of these models has been performed.

Table 19. Comparison of the Rankings from Different Models

Alternative	EDAS	TOPSIS	COPRAS
A1 (SH)	*2*	*2*	*2*
A2 (JS)	*1*	*1*	*1*
A3(BM)	*4*	*3*	*5*
A4 (MI)	*3*	*4*	*4*
A5 (IIS)	*5*	*5*	*3*

SENSITIVITY ANALYSIS

A sensitivity analysis is used to investigate the stability of the results over a varied range of input variable values. In the current study, there are 22 sub-factors involved, but the analysis over 22 weight patterns became burdensome. Therefore, to better understand the results, the top 10 sub-factors were selected for final analysis, based on their relative importance. The factors selected for analysis were price, ease of registration process, sharing contact details for interaction, richness of information, and all the sub-factors of both searching and matchmaking criteria. The stability of the results was analyzed by testing the model over 10 different sets of weights (indicated by P1-P10) of the top 10 sub-criteria. These sets have been selected such that they form an arithmetic series. As demonstrated through Table 20, in a particular set of weights one sub-factor has the lowest weight, while one sub-factor has the highest weight. The results of the sensitivity analysis indicate that the ranks of the alternatives remain stable over 8 out of 10 sets of weights (Figure 6, Figure 7). Two alternatives, jeevansaathi.com and shaadi.com, have consistently remained the best alternatives, while bharatmatrimony.com and iitiimshaadi.com have been among the worst alternatives. The changes in the rankings are smooth over the majority of the sets, indicating that the suggested method is effective for ranking the alternatives.

Table 20. Sets of Weights Used for Sensitivity Analysis

	Richness	Background	Lifestyle	Body type	Match 1	Match 2	Match 3	Phone	Registration	Price
P1	*0.018*	*0.036*	*0.055*	*0.073*	*0.091*	*0.109*	*0.127*	*0.145*	*0.164*	*0.182*
P2	*0.036*	*0.055*	*0.073*	*0.091*	*0.109*	*0.127*	*0.145*	*0.164*	*0.182*	*0.018*
P3	*0.055*	*0.073*	*0.091*	*0.109*	*0.127*	*0.145*	*0.164*	*0.182*	*0.018*	*0.036*
P4	*0.073*	*0.091*	*0.109*	*0.127*	*0.145*	*0.164*	*0.182*	*0.018*	*0.036*	*0.055*
P5	*0.091*	*0.109*	*0.127*	*0.145*	*0.164*	*0.182*	*0.018*	*0.036*	*0.055*	*0.073*
P6	*0.109*	*0.127*	*0.145*	*0.164*	*0.182*	*0.018*	*0.036*	*0.055*	*0.073*	*0.091*
P7	*0.127*	*0.145*	*0.164*	*0.182*	*0.018*	*0.036*	*0.055*	*0.073*	*0.091*	*0.109*
P8	*0.145*	*0.164*	*0.182*	*0.018*	*0.036*	*0.055*	*0.073*	*0.091*	*0.109*	*0.127*
P9	*0.164*	*0.182*	*0.018*	*0.036*	*0.055*	*0.073*	*0.091*	*0.109*	*0.127*	*0.145*
P10	*0.182*	*0.018*	*0.036*	*0.055*	*0.073*	*0.091*	*0.109*	*0.127*	*0.145*	*0.164*

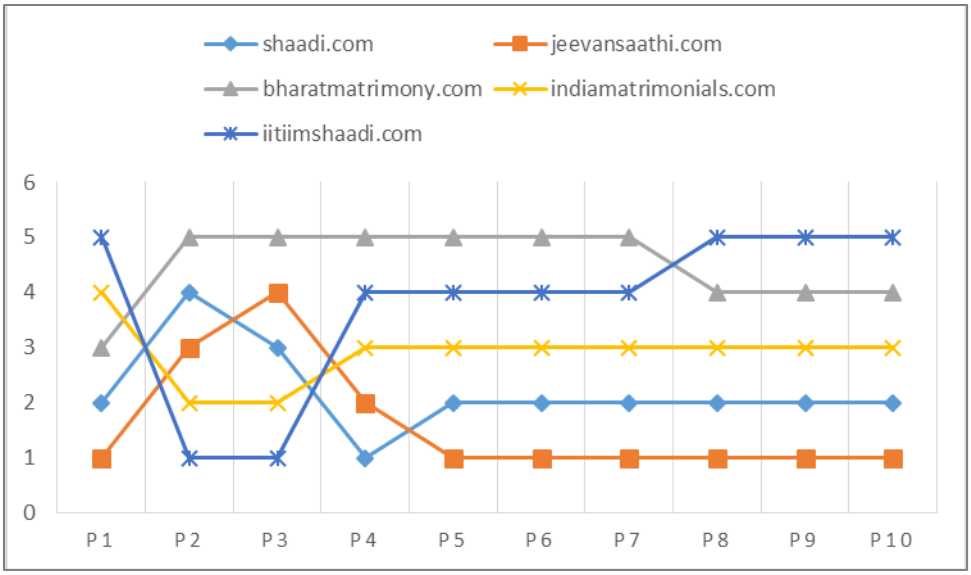

Figure 6. Results of Sensitivity Analysis for EDAS

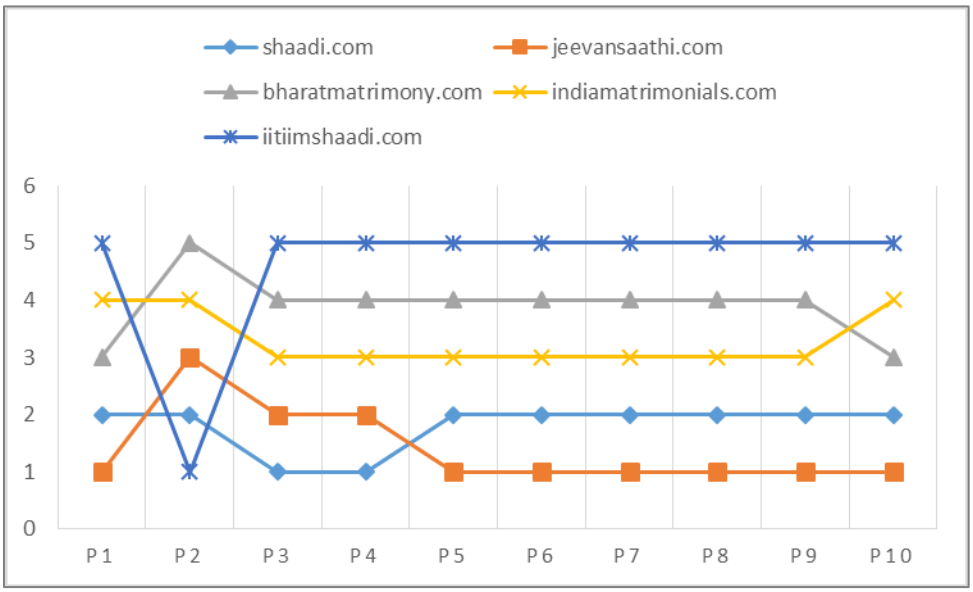

Figure 7. Results of Sensitivity Analysis for TOPSIS

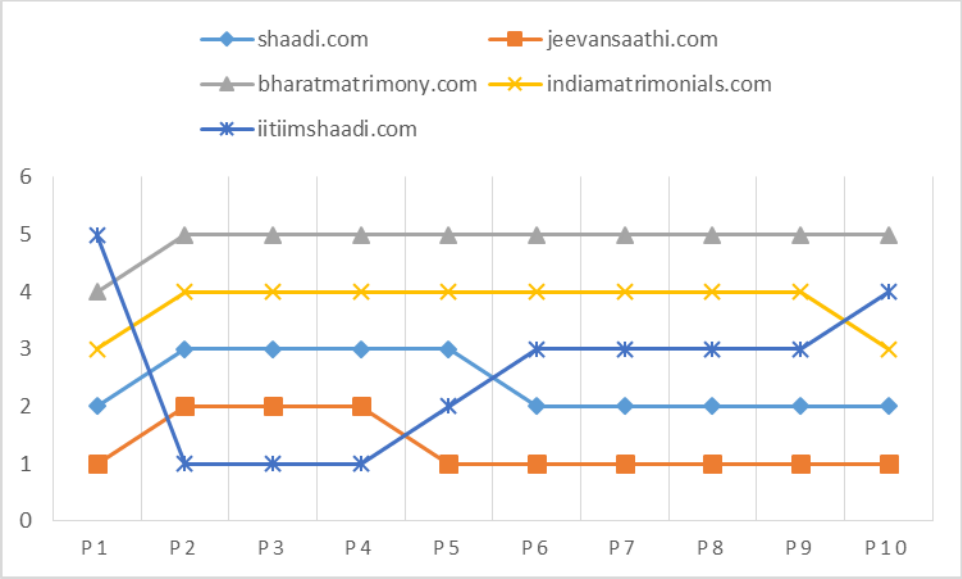

Figure 8. Results of Sensitivity Analysis for COPRAS

The similar performances of EDAS and TOPSIS can be attributed to fact that both methods are based on calculating the distances of alternatives from some reference point, while COPRAS is a simple summation method. Further analysis indicates that all three models demonstrate a sudden change of ranks as the weights change from P1 to P2 (Figure 6, Figure 7, and Figure 8). This change in the rankings can be attributed to the comparatively large change in the weight of the price criteria. As the weight of the price (cost criterion) decreases, the A5 becomes the best alternative, which clearly indicates that the A5 performs comparatively better than the other alternatives on the beneficial criteria and more poorly on the cost criteria. The results for EDAS and TOPSIS show less fluctuation in the ranking of A5 as compared to the result for COPRAS, indicating that the distance-based approaches give more stable results when opposite types of criteria are involved.

DISCUSSION AND MANAGERIAL IMPLICATIONS

The current study analyzed the similarities and differences in the website quality evaluations across the different user groups divided on the basis of gender and age. In general, all the user groups consider the search- and matchmaking-related options to be the most important factors affecting the quality of matrimonial websites. Therefore, the service providers should focus on improving the available search and matchmaking options and align these features more towards the personal preferences of the users.

The gender-based group analysis shows that females assign more importance to the price of the service and the quality of information. This may be accredited to the females being more concerned about the authenticity of the information displayed by others (Al-Saggaf, 2013). Under the information quality parameter, females are more inclined towards updated and detailed information. Therefore, up-to-date information with rich details may help in enhancing females' perception about the quality of the website. On the other hand, males consider the service quality and the ease of the registration process to be important. In order to make the registration process easier, the websites may provide the option to the user for linking the profile with other social media platforms. Even across the sub-factors, males prefer the built-in chat option for interaction while females prefer sharing contact details. In line with previous studies, males have been observed to prefer searching on the basis of an individual's body and complexion (Mishra et al., 2013; Ramasubramanian & Jain, 2009).

The younger respondents place comparatively more importance on website information, service quality and the price of the services, while the second age group respondents give more importance to the ease of the registration process. The study provides crucial evidence for service providers to consider while customizing service packages for different age groups. For older age group, service providers should focus on making the registration process easier and giving better search and match options for different price points.

The previous studies on website evaluation have considered only general quality parameters such as information, service, and system quality for evaluation (Bilsel et al., 2006; Lin, 2010). Context-specific parameters have not been considered. The current study contributes towards the website evaluation literature and emphasizes that service providers should focus on improving the features meant for fulfilling the needs of search, matchmaking, and interaction. These features may help them distinguish themselves from their competitors and gain an advantage. Service providers may focus on customizing service packages for users of different age groups. They may focus on providing assistance in the registration process for additional charges. Also, female users prefer detailed and regularly updated information; therefore, service providers may enhance the level of details and provide cues related to continuous updating of information. On the other hand, service providers may focus on improving service responsiveness and speed for male users.

According to the recent Alexa.com ranks of these websites are 3219 for SH (*Shaadi.Com Competitive Analysis, Marketing Mix and Traffic - Alexa*, n.d.), 4231 for JS (*Jeevansathi.Com Competitive Analysis, Marketing Mix and Traffic - Alexa*, n.d.), and 25477 for BM (*Bharatmatrimony.Com Competitive Analysis, Marketing Mix and Traffic - Alexa*, n.d.). It shows that JS and SH are gaining comparatively better user traffic. During the last 3 months, the rank of SH has improved a lot while it has declined for JS and BM. In terms of social media engagement and average time spent by a user on these websites, SH (9:35 minutes) and JS (9:10 minutes) perform better than BM (2:14 minutes). These metrics are indicative of better performance of website in attracting and engaging users.

In order to further validate the results, the researchers obtained responses about the overall quality of the top 3 websites from 5 experts, working in the e-commerce industry. The website interface of JS and SH has been found to be more user friendly and easy to use as compared to BM. The BM is just one part of a larger company matrimony.com, which consists of around 300 community based matrimonial portals. The company is also engaged in other matrimonial services such as photography, venue, and decorations. When a user registers on the portal, he/she automatically gets registered on a community-specific portal based on community selection. This feature may enhance search experience at a later stage, but at initial stage, it creates confusion in the user's mind about the identity of the platform. In addition, JS provides its services for a comparatively lesser price, which further enhanced its performance as per our analysis. Therefore, the major players should focus on improving their website quality and provide value for money services to the consumers.

CONCLUSION

This study describes a model for evaluating the quality of matrimonial websites. In addition to general website quality parameters, the current study also borrows context-specific features from the literature of matrimonial websites. The criteria selected for the evaluation are both qualitative and quantitative in nature. An integrated model containing fuzzy AHP and ranking approaches has been proposed to rank various matrimonial websites based on their performance.

The study contributes to the literature of website evaluation by emphasizing the importance of context-specific features for the users. It extends the DeLone and Mclean model of IS success by incorporating context-specific parameters for website evaluation. The differences in the preferences of the users based on their demographic characteristics have also been analyzed. The results of the

study reveal that in general search- and matchmaking-related criteria carry more importance for the users of matrimonial websites. However, the importance of price and website quality parameters differ between male and female respondents. Therefore, to reap the benefits, matrimonial service providers may treat male and female customers differently as per their preferences. Similarly, differences have been observed across different age groups. The comparison among the ranking methods indicate that models such as EDAS and TOPSIS, which are based on calculating the relative distance between the alternatives and ideal solutions, provide stable results as compared to the simple summation method of COPRAS. Therefore, it is recommended to use the former methods when both beneficial and cost criteria are involved for evaluation.

The study has several limitations which require further investigation in the future. First, the study has categorized different groups on demographic characteristics only. However, system usage behavior, such as the experience of using a system, may also act as an important factor for analysis. Second, the present study develops a model based on the fuzzy AHP for the evaluation of websites. However, future studies may adopt additional approaches for evaluation and perform a comparative analysis with the results of the present study. Third, the evaluation criteria included in the study have been selected through a review of the literature. However, there is the possibility of missing some important factors not studied in the literature. Future studies may adopt additional methodologies, such as focus groups and interviews, to identify additional parameters for evaluation.

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APPENDIX

EDAS

The steps proposed by (Keshavarz Ghorabaee et al., 2015) are as follows:

1. Select the criteria to be used for the evaluation of the alternatives.
2. Create a decision matrix containing the performance of each alternative corresponding to each criterion (indicated as X_{ij}), as shown below:

$$\mathrm{X} = \begin{bmatrix} X_{11} & X_{12} & \cdots & X_{1m} \\ X_{21} & X_{22} & \cdots & X_{2m} \\ \vdots & \cdots & \cdots & \vdots \\ X_{n1} & & & X_{nm} \end{bmatrix} \quad (1)$$

3. Compute the average solution by considering all the criteria, as shown below:

$$\mathrm{AV} = \left[AV_j\right]_{1\times m}, \text{ where } AV_j = \frac{\sum_{i=1}^{n} X_{ij}}{n} \quad (2)$$

4. Based on the kind of criteria as benefit or cost criteria, the positive distance from average (PDA) and negative distance from average (NDA) is to be computed as follows:

$$PDA = \left[PDA_{ij}\right]_{n\times m} \quad (3)$$

$$NDA = \left[NDA_{ij}\right]_{n\times m} \quad (4)$$

Here, PDA_{ij} and NDA_{ij} indicates the positive and negative distance of ith alternative from average solution w.r.t. jth criterion respectively. If the jth criterion is a beneficial criterion, then,

$$PDA_{ij} = \frac{\max\left(0, \left(X_{ij} - AV_j\right)\right)}{AV_j} \quad (5)$$

$$NDA_{ij} = \frac{\max\left(0, \left(AV_j - X_{ij}\right)\right)}{AV_j} \quad (6)$$

If the jth criterion is non-beneficial in nature then the formula for PDA and NDA are exchanged.

5. The weighted sum of all the PDA and NDAs is calculated as follows:

$$SP_i = \sum_{j=1}^{m} w_j PDA_{ij} \text{ and } SN_i = \sum_{j=1}^{m} w_j NDA_{ij} \quad (7)$$

Here, w_j indicates the weight of each criteria.

6. Normalize the SP and SN for all the alternatives and compute appraisal score as follows:

$$NSP_i = \frac{SP_i}{max_i(SP_i)}; NSN_i = 1 - \frac{SN_i}{max_i(SN_i)} \quad (8)$$

$$AS_i = \frac{1}{2}(NSP_i + NSN_i); here\ 0 \le AS_i \le 1 \quad (9)$$

The alternative possessing the highest value of AS score is the best choice among the compared alternatives.

REVISED TOPSIS

For the set of *m* alternatives$A = \{a_i | i = 1,2, \dots \dots, m\}$ and the set of *n* criteria $C = \{c_j | j = 1,2, \dots \dots, n\}$, the decision matrix can be represented as, $X = \{x_{ij} | i = 1,2, \dots, m\ ; j = 1,2, \dots, n\}$ where x_{ij} denotes the performance of *ith* alternative over *jth* criteria. For calculating the rankings, the steps are as follows:

1. Normalization of the decision matrix. The normalized decision matrix *rij* can be represented as,

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \tag{10}$$

2. Calculate the weighted normalized decision matrix, v_{ij}, using the given set of weights $W = \{w_j | j = 1,2, \dots, n\}$ as indicated below

$$v_{ij} = w_j * r_{ij}, i = 1,2, \dots, m; j = 1,2, \dots, n \tag{11}$$

3. Then the positive and negative ideal solutions are determined:

$$PIS = \{(\max v_{ij} | \ j \in J), (\min v_{ij} | \ j \in J') | i = 1,2, \dots, m\} = \{v_1^+, v_2^+, \dots \dots, v_n^+\} \tag{12}$$

$$NIS = \{(\min v_{ij} | \ j \in J), (\max v_{ij} | \ j \in J') | i = 1,2, \dots, m\} = \{v_1^-, v_2^-, \dots \dots, v_n^-\} \tag{13}$$

Where J is the set of benefit criteria and $J'$is the set of cost criteria.

4. The separation measures are calculated for each alternative The separation distance from PIS is,

$$D_i^+ = \left[\sum_j \left(v_{ij} - v_j^+\right)^2\right]^{\frac{1}{2}}, i = i, \dots, m \ alternatives \tag{14}$$

Similarly, the distance from NIS is,

$$D_i^- = \left[\sum_j \left(v_{ij} - v_j^-\right)^2\right]^{\frac{1}{2}}, i = i, \dots, m \ alternatives \tag{15}$$

5. By using these separation values the relative closeness to ideal solution RC_i^*, as per traditional TOPSIS is calculated as,

$$RC_i^* = \frac{S_i^{*-}}{S_i^* + S_i^{*-}}, 0 < RC_i^* < 1 \tag{16}$$

However, if the decision maker assigns the relative weights of $w^+ and\ w^-$ to the separation measures respectively, then the revised closeness index can be calculated as,

$$RC_i^* = w^+ \left(\frac{D_i^-}{\sum_{i=1}^{m} D_i^-}\right) - w^- \left(\frac{D_i^+}{\sum_{i=1}^{m} D_i^+}\right) \tag{17}$$

Finally, the alternatives are ranked on the basis of the value of RC_i^*. The alternative with highest value of RC_i^* is ranked high.

COPRAS

For calculating the ranks of the alternatives, the steps followed are,

1. Normalization of the decision matrix containing the values corresponding to the performance of each alternative over the set of criteria. The normalization is carried out as,

$$d_{ij} = \frac{w_i}{\sum_{j=1}^{n} x_{ij}} . x_{ij} \tag{18}$$

   Where w_i is weight of criteria *i* and , x_{ij} is the value corresponding to ith criterion and jth alternative.

2. Calculate the sum of weighted normalized beneficial and non-beneficial criteria describing the alternatives. These sums are computed as follows,

$$S_{+j} = \sum_{z_i=+} d_{ij} \tag{19}$$

$$S_{-j} = \sum_{z_i=-} d_{ij} \tag{20}$$

3. The relative significance Q_j of the alternatives, A_j can be determined as below:

$$Q_j = S_{-j} + \frac{S_{-min} . \sum_{j=1}^{n} S_{-j}}{S_{-j} \sum_{j=1}^{n} \frac{S_{-min}}{S_{-j}}} \tag{21}$$

   The alternative with highest value of Q_j is the best alternative. The method also helps to find the degree utility, N_j of the alternatives with respect to the best performing alternative. The degree utility is the percentage value ranging from 0-100 percent, where 100 percent is for best alternative.

$$N_j = \frac{Q_j}{Q_{max}} . 100\% \tag{22}$$