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Suggestion Systems: A Usability-Based Evaluation Methodology

Mohammed Arif*, Hani M. Aburas[(1)], Abdullah Al Kuwaiti[(2)] and Dennis Kulonda[(3)]

**Senior Lecturer, School of Built Environment, University of Salford, Maxwell Building, The Crescent; Greater Manchester, UK M5 4WT,*
[(1)]Department of Industrial Engineering Faculty of Engineering, King Abdulaziz University, P.O. Box 80204, Jeddah 21589, Saudi Arabia,
[(2)]The British University in Dubai, P.O. Box 502216, Dubai, UAE,and
[(3)]Florida Institute of Technology, Melbourne, Florida, USA
**m.arif@salford.ac.uk*

Abstract. Usability has been used to design and assess products and websites. This paper takes the concept of usability one step further and proposes a framework to assess suggestion systems. Thus taking the concept of usability one step further and applying it in the area of ideas management through suggestion system. The fundamental premise of the article is that a suggestion system designed, with usability in mind, will improve innovation among employees, and hence increase participation. This framework was then used to assess four suggestion systems in an oil and gas company in the middle-east. These systems were further assessed for employee perception of their usability and participation. After collecting data on these three different aspects conclusions are drawn. Out of the four systems analyzed, the most usable suggestion system had the highest participation rate and the least usable system attracted the fewest suggestions.

Keywords: Ideas Management, Innovation, User Centered Design, Usability, Management, Suggestion System, Employee Involvement in Quality Improvement

1. Introduction

Creativity is a basic human capability [1]. However, in a civilized society, ideas cannot be forced out of people, people themselves need to volunteer them [2]. Suggestion systems primarily consist of administrative procedures and infrastructure for collecting, judging and compensating ideas, which are conceived by the employees of the organization [3]. In addition, suggestion systems have the capability of being all inclusive by being able to focus on capturing ideas from all workers, and not just ideas from identified few smart workers [1]. Verespej [4] estimated an average benefit of $13 for every $1 spent on the system administration (including rewards) as identified, he also estimated that net savings of over $7000 are collected on average from every idea.

Involving people through suggestion systems is not a new phenomenon. *Shura* (consultation) was first introduced in Islam; it enforced the concept of consultation and urged to engage public participation. Such consultation council is ought to exercise the tasks entrusted to it, according to law and the basic law of governance while maintaining justice and transparency. In other words, discussions and decision making by *Shura* body and its committees, among all involved parties in relation to any public topic or concern, represent a vital area for the practice of the first suggestion system, the *Shura* system [5]. In 1721, Yoshimune Tokugawa, the 8th Shogun, placed a box called "Meyasubako" at the entrance of the Edo Castle for written suggestions from his subjects. Although the mechanism and associated rewards of this suggestion system are not known, it is one of the earliest ever known suggestion systems. The first industrial suggestion system known to us is the one established by William Denny in his shipyard in Glasgow in the year 1880 [6]. People have analyzed different aspects of suggestion systems, their success factors and barriers. We have come a long way from the days of suggestion boxes to sophisticated computer-based suggestion systems. Nevertheless, irrespective of the difference in types, and technological complexities of suggestion systems, one common issue affecting them is how to make them work effectively. Research indicates that several suggestion systems fail to attract sufficient participation [1, 3 & 7]. This research proposes an evaluation framework of a suggestion system based on usability principles, commonly practiced in the IT and product design domains.

Rich literature exists on different aspects of the suggestion systems. The success factors related to suggestion systems can be divided into the following six main areas: 1) Ease of use; 2) Supervisory support; 3) Colleague support; 4) Clarity of scope; 5) Rewards and 6) Feedback.

Usability is defined as the "efficiency, effectiveness and satisfaction with which specified users can achieve specified goals in particular environments" [8]. Usability aims to ensure quality in use for the intended user of a finished product [9]. It is a process rooted in traditional engineering disciplines [10] providing techniques to support resource management in system design and development [11]. The aim is to design and engineer the best solution for an individual system by centering the process on the users and their tasks [12]. Nielsen [13], one of the pioneers in the field of usability proposed a model to measure usability. According to him, in order to measure usability of a system, the following five elements should be evaluated: Learn-ability, efficiency, memorability, errors recovery and satisfaction.

Several other usability models are also available, but they mostly focus on integrating user (and stakeholders) feedback through different stages of design [14-16 & 17]. In general these models represent a continuous loop of improvement through different stages from product design to product launch. These models emphasize testing the product through its life cycle and collecting user feedback, and then using them for amendment and improvement. These models are suitable for designing a new product and thus will not yield big benefits in developing our model because this study aims to develop and evaluate existing suggestion systems. Therefore, for this research, the model proposed by Nielsen [13] will be used as a basis for linking usability and suggestion systems. This model will be used as the foundation for developing the framework for usability of suggestion systems.

This paper has three major purposes: 1) To develop usability based evaluation framework for a suggestion system; 2) To test the applicability of this framework on a test case, and 3) To predict user acceptance of the suggestion systems based on usability evaluations.

The rest of the paper contains the development of the framework, description of the evaluation methodology, results, analysis, and conclusion.

2. The Proposed Framework

This section takes the concept of usability as described by Nielsen [13] and the six main success factors of suggestion systems to develop an evaluation framework.

2.1 *Ease of Use*

Making the suggestion system user friendly makes the task of participation easy [1, 3, 7, 18& 19]. First, we have to analyze ease of use, for its interpretation in usability terms. It is obvious, that an easy system can be learnt faster (learn-ability), remembered more easily (memorability), would improve the efficiency, as far as using it is concerned (efficiency), and would be prone to fewer errors. Literature is replete with articles identifying the importance of ease of system usage for improving participation [3], but little details on how to make the system easy are available. The guidelines of usability will be used to expand the ease of use factor to include the following elements; accessibility, clear guidelines, universality, friendly interface and flexibility [13].

Accessibility is concerned with the availability of the system for intended users as per the scope. For example, if the system scope invites all workers to participate, the means of sending suggestions by all should also be available. It can also cover ease of use by arranging meetings with suggestion system coordinator and suggestion committee members (if one exists). Members of the committee should have their contact information publicized.

There should be clear guidelines on how to use the suggestion system in order to facilitate raising more suggestions, especially for first timers, new workers, and visitors.

Universality covers the ability of employees from all groups to participate. For example, if there is a group of employees who do not know English, then all the components of the system should be made available in a language they are familiar with.

If the suggestion system interface is not user-friendly, attractive and efficient, it can potentially inhibit participation. This phenomenon has been quite commonly observed in website usability where it has increased web traffic by 60-100 % [20]. In one study, the sales of software jumped by 60 % and many customers cited usability as a key factor in

buying the new system [21]. Major issues with interfaces are: Lack of clarity, use of difficult words and insufficient space to write suggestions. If the form or software interface is congested with information, it can intimidate users as they will think it requires a lot of effort to complete it. Users often report that they are "overwhelmed" by the information-crowded user interface [22]. If software is used, the interface should not require access to more than one page to be able to send ideas which will speed the sending process. In addition, to allow for universality, forms can be designed in different commonly used languages. Moreover, having a serial number on each form can help in tracking ideas and can improve feedback.

A flexible system is a system that offers different ways of doing the task and provides options to choose from. A suggestion system can be flexible in many ways, like providing both a paper based and a software based system interface for sending ideas.

2.2 *Supervisory Support*

The supervisory support was identified in the literature review as an important success element [23-25]. It does add value to usability because in work environment, especially in hierarchical organizations, supervisors have direct influence on workers, and can encourage them to use suggestion systems more frequently and monitor their performance (efficiency). Supervisors can improve the learn-ability of the system by providing training or sending their workers for training courses on the use of the system. Also, they can improve workers' satisfaction from their experience in sending ideas by encouraging and helping them, and facilitating sending the idea and receiving feedback.

2.3 *Colleague Support*

Support from colleagues is another element that has been cited in literature as very important in enhancing participation in suggestion systems [3, 26-28]. When workers can find help through their colleagues, they will most likely use the system, especially first timers, because they can find someone to show them how to use it (learn-ability) thus leading to fewer errors (error recovery). Efficiency in using the system can also develop as a by-product from competition between colleagues who submit more ideas just to outperform others.

2.4 *Clear Scope*

As was found in the literature review, for suggestion systems to flourish a clear scope is required [3, 7, 29 & 30]. Usability can help promote clear scope by directing attention to both the system and the users. For the users, the selected usability definition encourages designing a system that helps users, make less errors. Therefore, efforts should be directed at providing workers clear definition about the system scope and thus avoiding unwanted suggestions. As for the system, usability encourages learn-ability, which can be enhanced by providing training on the system, so that workers know what ideas are needed. Clear scope can also help workers remember what the system is intended for, when submitting ideas again (memorability). Clarity of scope should also include the kind of ideas expected from employees at different levels.

Different companies (and departments within companies) want different types of ideas. They want different magnitudes as far as the impact is concerned, and some even run themed periods where workers have to submit ideas on a certain theme for example efficiency, customer satisfaction, and quality.

2.5 *Appropriate Rewards*

Reward is another key element identified in the literature review as a major success factor for suggestion systems [1, 24, 28, 29, 31-35]. This factor focuses on incentives given to workers for submitting ideas via suggestion systems. From a usability perspective, satisfactory experience is a key element in using any system and it is believed that rewards help in creating a positive experience (satisfaction). In addition, incentives can improve learn-ability by encouraging workers to attend training workshops on suggestion systems, hoping to receive favorable outcome from submitting ideas. Flexibility is a key element in usability and for this element, rewards can be flexible, by offering different types of rewards to appeal to different workers and thus increasing the number of potential participants. This element can be broken into the availability and choice of rewards.

2.6 *Feedback*

One other success element for a suggestion system is appropriate and timely feedback [1, 7, 25, 28 & 36]. Feedback is important for usability, as lack of feedback can lead to workers feeling ignored and dissatisfied. In

addition, all the investigated idea management models recognize the importance of feedback. Feedback can also help in error recovery where workers can further improve the quality of their ideas based on the feedback they receive. In addition, feedback can improve efficiency as workers will have the system coordinator/suggestion committee comment on their ideas and leading over a period of time to better understanding of the functioning of the suggestion system. By applying usability guidelines, feedback can be further divided into the mechanism of feedback and the promptness in providing it. As in the case of rewards, feedback should also be flexible in its delivery like by e-mail, verbal or on a specially designed certificate. Usability studies on websites show that long loading time for websites or providing information increases user frustration and decreases traffic [13]. Thus, making a case for providing the feedback faster, in order to make it more usable. Finally feedback should be detailed enough to aid workers know the status of their idea, how to receive the reward (if any) and reasons for rejection, if that is the case.

One element that is common to all the other factors is the satisfaction, a key element in Nielsen's usability framework [12]. All the above factors will result in employee satisfaction thus encouraging them to submit more suggestions.

Table 1 summarizes the discussions of the last section, establishing a relationship between usability model elements and suggestion system success factors. An "X" in the table indicates if there is a relationship while a blank cell indicates no relationship.

Table 1: Relationship between success factors and usability elements.

	Usability Model Elements				
Suggestion System Success Factors	Learn-ability	Memorability	Efficiency	Error Recovery	Satisfaction
Ease of Use	X	X	X	X	X
Supervisory Support	X		X		X
Colleague Support	X		X	X	X
Clear Scope	X	X		X	X
Appropriate Rewards	X				X
Feedback			X	X	X

3. Case Study

In order to analyze the premise of usability contributing to higher participation rate, a case study of four suggestion systems in a major oil exploration company has been investigated.

The company has different operational sites including drilling rigs, production platforms, different barges, an industrial island, a supply base and different offices. Around 2200 employees with about 4000 contracted workforce are employed. This company is constantly striving for improvement by introduction of new technologies and methods in operations. In addition, management consultants are frequently invited to look for ways to improve the workplace. Many management initiatives are underway. These initiatives improve management-worker communication through multiple communication meetings and by adopting a work culture that is inclusive of all employees and which is based on the foundation of transparency. Each employee is assessed annually, based on several Key Performance Indicators (KPIs). Annual bonus to each employee is based on his/her performance against these KPIs. Managers have the authority to reward their workers for outstanding work through a "Spot Recognition Award". Majority of the workforce is deployed on the operations sites, and is mostly blue-collared, with less than secondary school education from non-English medium.

The suggestion system is called the Near Miss (NM) system. This is a hazard reporting system, which captures and identifies hazardous situations relating to Health, Safety and Environment (HSE) that can cause injury to people, damage to equipment or harm to the environment. The second system is the Operations (Ops) System, which is the suggestion system at operational sites like oil rigs and processing facilities. This system primarily deals with operations related improvements. The third system is called the Web Comments (Web). It was started with an intention to receive comments about company's intranet. The last system is the Pan Company (PC) system. This system was the only integrated company-wide system which had the mandate to collect suggestions in any area. All the other three were site or department specific. Operationally, each of these systems is independent of the other. However, there are several employees in the company who are eligible to participate in more than one system.

4. Evaluation Methodology

The first step in the evaluation methodology was to assess the usability of suggestion systems using the developed framework consisting of 19 major elements (Table 2). The analysis assumed equal weighting for all these elements. The second step was to assess employee perception about the selected systems. A standard system usability survey instrument, which is very common in usability literature, was used to assess system usability, as perceived by employees who are eligible to submit suggestions for each of those four systems. The last step was to analyze the number of submissions for these systems over a period of six months.

Step 1 : Assessment of the Suggestion System Usability Using the Proposed Framework

As we mentioned earlier, the first step is to analyze how many of these characteristics exist in each of the suggestion systems. For the purpose of this research it is assumed that all the characteristics have equal impact and weights. In order to assess the presence of these characteristics, the administrators of the systems were interviewed and artifacts like submission forms/interface, past documentation, comments on suggestions, were analyzed. Table 2 summarizes the result, a "1" in a cell indicates the presence of that characteristic in a suggestion system, and a "0" indicates a lack of it. These 19 characteristics were developed by the authors using the literature review for usability and drawing parallels in the suggestion system. A complete description of the scoring procedure and rationale for each suggestion system is available from the authors. The results are presented in Table 2.

It is clearly shown that out of the 19 possible characteristics for usability, the NM system had 15, the Ops and Web system had 8 each and the PC system had 7.

Step 2: Assessment of the Suggestion System Usability as Perceived by Users

The second step in this research was to assess the system usability, as perceived by the users. In the last section we evaluated usability by matching suggestion system characteristics to usability features. However, this step will assess the perception of users on usability for the

Table 2. Summary of existing characteristics per suggestion system.

Success Factor		Characteristics	Suggestion System			
			NM	PC	Ops	Web
Ease of Use	1	Are different means of sending ideas available?	1	1	1	0
	2	Are guidelines available and published?	1	1	0	0
	3	Does the system accept multiple languages?	0	0	0	0
	4	Is enough space available for writing and is interface easy to use?	1	1	0	1
	5	Can attachments be used?	1	1	1	0
	6	Are suggestion forms accessible?	1	1	0	1
Supervisor Support	7	Do supervisors encourage workers to send ideas?	1	0	0	0
	8	Do supervisor-worker meetings include suggestion system on the agenda?	1	0	0	0
	9	Are new employees briefed on the system and sent for training?	1	0	0	0
Colleague Support	10	Does the system allow for group participation?	1	1	1	1
	11	Does the system allow for feedback from other workers of the organization?	0	0	1	1
Clear Scope	12	Does the system accept and encourage small ideas?	1	0	1	1
	13	Is everyone eligible to participate?	1	1	1	1
Appropriate Rewards	14	Are rewards available?	1	0	1	0
	15	Are rewards given for just sending ideas?	0	0	0	0
	16	Is a selection of rewards available, for workers to choose from?	1	0	1	0
Feedback	17	Are different ways of sending feedback available?	1	0	0	0
	18	Is the time to provide feedback reasonable?	0	0	0	1
	19	Is the feedback detailed?	1	0	0	1
Total			**15**	**7**	**8**	**8**

entire system. Therefore, in order to assess it, any system usability framework can be used. A review of literature revealed many different approaches like System Usability Measurement Inventory (SUMI), Heuristic Evaluation, Cognitive Walkthrough, and System Usability Scale (SUS) [37-40]. For the purpose of this research we chose SUS as the evaluation framework. This choice was made due to three major reasons. The first one was the simplicity of the framework; SUS is very simple to

use. The second reason was that this evaluation framework, evaluates a system and not an interface, as compared to others, and the third one is that found to be 85% reliable [41].

SUS consists of ten statements, and the participant has to rate the statements on a scale of 1 to 5, 5 being Strongly agree and 1 being strongly disagree. The ten statements are summarized in Table 3.

Table 3. System usability scale framework.

Item #	Statements
1	I think that I would like to use this system frequently
2	I found the system unnecessarily complex
3	I thought the system was easy to use
4	I think that I would need the support of technical person to be able to use this system
5	I found the various functions in this system well integrated
6	I thought there was too much inconsistency in this system
7	I would imagine that most people would learn to use this system very quickly
8	I found the system very cumbersome to use
9	I felt very confident using the system
10	I needed to learn a lot of things before I could get going with this system

The scoring for SUS is quite simple. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. For items 2, 4, 6, 8, and 10 the contribution is 5 minus the scale position. Multiply the sum of scores by 2.5 to obtain the overall value for System Usability (SU). The higher the SU, the higher the usability of the system.

In order to conduct the survey, a brief statement about the purpose of this study was prepared, and the framework was modified by replacing the word "system" with the specific suggestion system name. Employees were asked to fill the survey only if they had used the specific system. Each employee was sent all four questionnaires (one for each system) either by email (as an MS Excel attachment) or by internal mail in hardcopy format. Total of 200 people were dispatched all four questionnaires and a period of 2 weeks was given for receiving the response. After two weeks the responses received, were screened to remove responses where people might have selected 2 numbers instead of one. Out of 152 responses received, 7 were disregarded. Table 4 summarizes the number of responses for each system.

Table 4. Responses for each system.

Suggestion System	NM	PC	Ops	Web
No. of Responses	52	24	30	39

All the 145 responses were from people who had used only one of the systems. Once the responses were received, the results were tabulated and SUS for each response was calculated. In order to first test if the mean SUS are equal or not single factor ANOVA was performed at 95% significance using SPSS. Results are summarized in Table 5.

Table 5. Results of ANOVA.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	50012.224	3	16670.741	415.200	.000
Within Groups	5661.310	141	40.151		
Total	55673.534	144			

Since F> Fcrit (Fcrit is 2.68 for df 3 and 141), we can conclude that at least one of the means is significantly different than others. The ANOVA was followed by a Tuckey's t-test at 95% confidence, comparing two systems at a time. The SPSS output is displayed in Table 6. The significance levels of all the pairs are well below zero, therefore all means are different.

Table 7 ranks the four systems based on the mean SUS scores, NM is ranked the highest, followed by Web, then Ops and then PC systems.

Table 6. SPSS output for Tuckey's t-Test.

(I) system	(J) system	Mean Difference (I-J)	Std. Error	Significance	95% Confidence Interval	
					Lower Bound	Upper Bound
NM	PC	45.66506(*)	1.56368	.000	41.5996	49.7305
	Ops	39.43590(*)	1.45276	.000	35.6588	43.2130
	Web	12.50000(*)	1.34226	.000	9.0102	15.9898
PC	NM	-45.66506(*)	1.56368	.000	-49.7305	-41.5996
	Ops	-6.22917(*)	1.73532	.003	-10.7409	-1.7174
	Web	-33.16506(*)	1.64392	.000	-37.4392	-28.8910
Ops	NM	-39.43590(*)	1.45276	.000	-43.2130	-35.6588
	PC	6.22917(*)	1.73532	.003	1.7174	10.7409
	Web	-26.93590(*)	1.53879	.000	-30.9367	-22.9351
Web	NM	-12.50000(*)	1.34226	.000	-15.9898	-9.0102
	PC	33.16506(*)	1.64392	.000	28.8910	37.4392
	Ops	26.93590(*)	1.53879	.000	22.9351	30.9367

* The mean difference is significant at the .05 level.

Table 7. SUS Ranking.

RANK	SYSTEM	MEAN SUS
1	NM	78.27
2	Web	65.77
3	Ops	38.83
4	PC	32.6

Step 3: Submissions Analysis for All Systems Over a Period of Six Months

Except for NM, none of the other systems maintain a participation data. Therefore, for the purpose of this research, coordinators/ administrators were asked to keep data on the number of submissions for a period of six months starting March 2006 and ending September 2006. Table 8 summarizes the average monthly submission for the four systems.

Table 8. Monthly submission data.

	Suggestion Systems			
	NM	**PC**	**Ops**	**Web**
Monthly Submission	170	10	55	110

Although it is difficult to correlate the usability with participation rate with a small dataset, still the magnitude of difference between NM and all others cannot be ignored. NM, which satisfied the most number of Usability factors, has the highest participation, a participation rate approximately 50% higher than nearest system in terms of participation.

5. Analysis

The following table summarizes the results of all the three analyses conducted so far.

Table 9. Final analysis ranking.

SYSTEM	RANKING		
	CASE ANALYSIS	**SUS**	**PARTICIPATION**
NM	1	1	1
PC	4	4	4
Ops	2	2	3
Web	2	3	2

Two factors that are constant in all the three analyses is that NM is consistently ranked number one in all three, and PC is consistently ranked as the worst system. There is a tie in Ops and Web in the case analysis and they flip ranks in the other two. This inconclusive ranking between Ops and Web can be attributed to two factors; first of all in this research we highlighted 19 usability related variables and assigned all of them equal weighting, future research is needed to assess the exact weighting of all these factors. The second issue is that for the Web system, although people don't find it as usable as Ops, still just the easy availability/accessibility (Item 6 in Table 2) of the system, compared to Ops encourages more participation.

Although it is not completely scientific to correlate high usability to high participation, based on analysis of just four systems, still the magnitude of differences in scores for the number of usability features possessed, usability scores, and participation cannot be ignored. NM came out to be significantly better on all aspects, compared to other systems, and PC was ranked the lowest in all categories. Usability literature is replete with cases of positive effect of usability on performance of websites, either in the form of increased sales for e-commerce websites [42] or just increase in user traffic for information only types of sites [43]. In this research, the concept of usability has been extended to suggestion systems, and preliminary indicators do highlight that at least one system, that was rated the most usable system using the usability-based evaluation framework, attracts highest number of suggestions, and the one rated lowest is struggling for suggestions.

6. Conclusion

There were three major purposes of this paper: 1) To develop a usability-based evaluation framework for suggestion systems; 2) To test this framework on an example suggestion system, and 3) To predict user acceptance of the suggestion systems based on usability evaluations. The definition proposed by Nielson [13] was used as the basis of development of the framework. This framework consists of the following five elements: learn-ability, efficiency, memorability, errors recovery and satisfaction**.** Further, literature review of suggestion system was conducted. The literature was primarily in six major areas: ease of use, supervisory support, colleague support, clear scope, rewards and

feedback. On further analysis it was found that each of these six areas addresses one or more of the usability elements. Based on this analysis a framework was developed, which consisted of these six areas, and within each of these areas several aspects which totaled 19 for the entire system.

This research stresses the fact that satisfaction and confidence in the system get the wheels of submitting ideas, rolling. Satisfaction is attained from the completion of the full idea management process, but the combination of the six areas have a direct impact on workers' satisfaction as they focus on workers personnel experience and perception. The model is not suggesting that the process of sharing ideas is straight forward but it aims at providing an approximation of reality which can help in fixing problems with systems that have low participation (by conducting gap analysis) or when introducing new suggestion systems. Although there were only four suggestion systems considered in this research, still the one that was ranked the highest by the usability model, did attract significantly higher participation, and the one that was rated the lowest was attracting significantly fewer suggestions.

This research provides a good starting point for connecting usability the concept to user acceptance of suggestion systems. Future research can concentrate on assessing the weighting of different factors in the usability model, and correlating each factor's impact on participation and employee perception of usability.

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أنظمة الاقتراح: إطار عمل تقييم مبنىّ على صلاحية الاستخدام

محمد عارف، هاني محمد أبوراس [١]، عبدالله الكويتي[٢]، دينيس كولوند[٣]

جامعة سالفورد، مانشستر، المملكة المتحدة ، و [١]جامعة الملك عبدالعزيز، ص.ب. ٨٠٢٠٤، جدة ٢١٥٨٩، المملكة العربية السعودية، و [٢]الجامعة البريطانية بدبي، ص.ب. ٥٠٢٢١٦، الإمارات العربية المتحدة، و [٣]معهد فلوريدا للتقنية ، فلوريدا، الولايات المتحدة الأمريكية

المستخلص. لقد استخدمت صلاحية الاستخدام لتصميم وتقييم المنتجات ومواقع الشبكة العنكبوتية. وهذه الورقة تأخذ مفهوم صلاحية الاستخدام خطوة إلى الأمام وتقترح إطار عمل لتقييم أنظمة الاقتراح. وبالتالي تأخذ مفهوم صلاحية الاستخدام خطوة إلى الأمام وتطبقه في مجال إدارة الأفكار من خلال نظام اقتراح. وإن المقدمة الأساسية للبحث هي أن نظام اقتراح مصمم، مع اعتبار صلاحية الاستخدام، سيحسن الابتكار بين المستخدَمين، وبالتالي يزيد من المشاركة. وإطار العمل هذا يتم استخدامه لاحقاً لتقييم أربعة أنظمة اقتراح في شركة للبترول والغاز في الشرق الأوسط. وهذه الأنظمة يتم تقييمها أيضاً للإدراك الحسي للمستخدَمين من خلال صلاحية الاستخدام والمشاركة. وبعد تقسيم المعطيات حسب علم المثلثات باستخدام هذه الطرق الثلاث تم استنباط النتائج. ومن بين الأنظمة الأربعة التي تم تحليلها، فإن نظام الاقتراح الأكثر قابلية للاستعمال هو النظام الذي حقق أكثر معدل مشاركة، ونظام الاقتراح الأقل قابلية للاستعمال هو النظام الذي اجتذب أقل المقترحات. وإن إطار العمل الصالح للاستخدام والذي تم تطويره

في هذا البحث يمكن استخدامه لعمل تحليل فجوة لأي نظام اقتراح، وتحديد المجالات للتحسين.

الكلمات الدالة: إدارة الأفكار، الابتكار، التصميم المتركز على المستخدِم، القابلية للاستخدام، إدارة، نظام اقتراح، تفاعل المستخدَمين في تحسين الجودة.