Publié par : Faculté des sciences de l'administration
Published by : Université Laval
Publicación de la : Québec (Québec) Canada G1K 7P4
Tél. Ph. Tel. : (418) 656-3644
Fax : (418) 656-2624

Édition électronique : Céline Frenette
Electronic publishing : Vice-décanat à la recherche et au développement
Edición electrónica : Faculté des sciences de l'administration

Disponible sur Internet : http ://www.fsa.ulaval.ca/rd
Available on Internet rd@fsa.ulaval.ca
Disponible por Internet :

DOCUMENT DE TRAVAIL 1998-027

DEVELOPING AND EVALUATING METHODS FOR USER SATISFACTION MEASUREMENT

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Version originale : ISBN – 2-89524-058-2
Original manuscript : ISBN -
Version original : ISBN -

Série électronique mise à jour : 09-1998
One-line publication updated :
Seria electrónica, puesta al dia

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September 1998

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Introduction

The role of the IS department has changed considerably during the last decade. With IS having a much broader impact on organizational effectiveness and strategy, many more IS departments are required to justify their role and to adopt a customer based approach to serving the users in the organization. Evaluating the quality of their services and measuring user satisfaction is becoming more and more common practice.

Although some validated instruments have been available to measure user satisfaction, they have been limited in the flexibility they provide to fit an organization's specific measurement needs. IS departments or organizations can certainly use the previously developed instruments as a starting point for developing their own tools, but they will also need to define their evaluation objectives, who they want to survey, when they want to survey, about what, etc. The conceptual frameworks that evolved from the "user satisfaction" stream of research can provide a valuable guideline for this exercise. The objective of this paper is twofold: First, to illustrate, with a case, the variety of instruments used in an organizational setting. Secondly, we show how the previously developed theories and frameworks can still be used as a guide to evaluate an organization's user satisfaction measurement strategies and instruments.

Review of concepts and measurement instruments

Many authors agree that measuring "user satisfaction" is the most useful and easy way to evaluate information system success. Through the years, many different research streams have focused on developing valid tools and techniques to measure satisfaction. The most influential have been the following:

"User Information Satisfaction" (UIS)

Initially, this research work was undertaken because of two important observations: (1) the difficulty of measuring the impact of new systems on organizational productivity, and the increasing popularity of satisfaction as a surrogate measure (2) and the absence of a formal, reliable and valid tool to measure satisfaction. Most of this work was therefore dedicated to the development of an appropriate tool to measure Information System User satisfaction.

The first questionnaire was the one developed by Bailey & Pearson [1]. The original version contained 39 items (*Top management involvement, Vendor support, Accuracy, Timeliness, Format of output, Error recovery, Confidence in the system*, etc.). Each question contained a title (as those stated above) and a brief definition. Four different scales were used (e.g.: *Strong Vs Weak, Consistent Vs Inconsistent, Good Vs Bad, Significant Vs Insignificant, Precise, Vs Vague, Harmonious Vs Dissonant*). Scales varied from one question to the other.

Ives, Olson & Baroudi [5] considered Bailey & Pearson's work as being ground breaking, although the questionnaire was long and difficult to complete. They reduced the length of the questionnaire to 13 items and two scales per item, while showing that the short version remained a powerful and valid tool for satisfaction measurement. Later on, Galletta & Lederer [4], found Olson & Baroudi's short version low on reliability, attributing this to the ambiguity of the different scales. They added four global questions on user satisfaction:

"How satisfied are you with your involvement and participation in the operation and ongoing development of information systems?"
"How satisfied are you with the support and services of the EDP department?"
"How satisfied are you with the information product itself?"
"In summary, how satisfied are you with the entire *information systems environment?"*

They found these four questions to be more reliable than the other more detailed questions and attributed this to the clarity of the formulation and to the lower possibility of misinterpretation.

"End-User Computing Satisfaction" (EUCS)

With the advent of personal work stations and "end-user computing", the tools measuring user satisfaction developed by Bailey & Pearson [1] and by Ives & al. [5] became out of date and needed to be adapted to these new environments. Doll and Torkzadeh [3] noted that:

"The Ives, et al., instrument was designed for the more traditional data processing environment. It measures general user satisfaction with EDP staff and services, information product, and user

involvement/knowledge rather than satisfaction with a specific application. Indeed, it has not been validated for use in assessing specific end-user applications. It also ignores important ease of use aspects of the man-machine interface."

They developed a new UIS instrument to measure the satisfaction of end-users who directly interact with a specific application. The twelve-item instrument can be construed as a measure of satisfaction with components of a specific information system product:

CONTENT
C1: Does the system provide the precise information you need?
C2: Does the information content meet your needs?
C3: Does the system provide reports that seem to be just about exactly what you need?
C4: Does the system provide sufficient information?

ACCURACY
A1: Is the system accurate?
A2: Are you satisfied with the accuracy of the system?

FORMAT
F1: Do you think the output is presented in a useful format?
F2: Is the information clear?

EASE OF USE
E1: Is the system user friendly?
E2: Is the system easy to use?

TIMELINESS
T1: Do you get the information you need in time?
T2: Does the system provide up-to-date information?

They use a Likert scale ranking from *"1 = almost never"* à *"5 = almost always"*. The instructions are given so that the respondent can choose the rank *"which best described their satisfaction"*.

"Service Quality" (SERVQUAL)

The objective of this stream, to measure service quality, was basically triggered by: (1) the need and the opportunity to develop a standardized tool to measure customer perceptions of quality of the service provided by an organization and (2) a "quality" model based on the gap between the real quality and the one perceived by customers, or the visible quality [8].

For many years this area of research developed itself independently from the Information Systems work and led to a well known and highly used tool in marketing: SERVQUAL [7]. The instrument contains two series of 22 questions: the first series measures customer expectations and the second measures the customer's perception of the organization. In each of theses two sections, five dimensions are evaluated and questions are rated from 1: Strongly disagree to 5: Strongly agree:

TANGIBLES
P1: XYZ has modern-looking equipment.
P2: XYZ's physical facilities are visually appealing.
P3: XYZ's employees are neat-appearing.
P4: Materials associated with the service (such as pamphlets or statements) are visually appealing at XYZ.

RELIABILITY
P5: When XYZ promises to do something by a certain time, it does so.
P6: When you have a problem, XYZ shows a sincere interest in solving it.
P7: XYZ performs the service right the first time.
P8: XYZ provides its services at the time it promises to do so.
P9: XYZ insists on error-free records.

RESPONSIVENESS
P10: Employees of XYZ tell you exactly when services will be performed.
P11: Employees of XYZ give you prompt service.
P12: Employees of XYZ are always willing to help you.
P13: Employees of XYZ are never too busy to respond to your requests.

ASSURANCE
P14: The behavior of employees of XYZ instills confidence in customers.
P15: You feel safe in your transactions with XYZ.
P16: Employees of XYZ are consistently courteous with you.
P17: Employees of XYZ have the knowledge to answer your questions.

EMPATHY
P18: XYZ gives you individual attention.
P19: XYZ has operating hours convenient to all its customers.
P20: XYZ has employees who give you personal attention.
P21: XYZ has your best interests at heart.
P22: Employees of XYZ understand your specific needs.

While versions of SERVQUAL are continuing to be criticized and improved, SERVQUAL stands as the preeminent instrument within marketing practice and research for the assessment of perceived service quality.

"Information System Success Model" (ISSM)

The last three areas we have described continue to be developed independently, but some recent work has attempted to conciliate these different streams into one global model of information system . The *"Information System Success Model" (ISSM*) was elaborated based on the observation that previous research confounded components of satisfaction and factors that are causally linked to satisfaction*:*

"[...] we were concerned that the items included be measures of satisfaction rather than measures of factors that cause satisfaction. In the early stages of research on new phenomena, cause and

effect items are often grouped together to describe phenomena. Bailey and Pearson's (1983) work on the development of a user satisfaction instrument is a good example of this tendency. The items they used to measure user satisfaction included several factors, such as user involvement, top management involvement, documentation, relationship with EDP staff, and vendor support, that are often treated by others as variables that cause satisfaction." [10]

In the same order, DeLone & McLean [2] argued that "quality" and "satisfaction" are not the same and should be separated in a conceptual description of system success. Their proposed model evolved into the Augmented ISSM [9,10] , which is presented in Figure 1.

Insert Figure 1 about here

According to this new model, three dimensions, "System quality", "Information quality" and "Service quality" influence two other important dimensions: "User satisfaction" and "Use" (Usefulness). These two will influence each other and influence the individual's task and productivity (Individual Impact). An impact at the individual level will in turn have an impact on the organizational level and modify organizational performance.

Limitations of the instruments

Most of the work described in the previous section has been dedicated to the development of instruments that would 1) contain the major components underlying the complex concept and 2) be valid and reliable in order to be used for research and practice. The use of these instruments in research has been widespread, as user satisfaction is convenient surrogate measure for system success. Their use, in practice, however, does not seem to have had the same popularity. One of the reasons may be that until now, very few organizations have put some effort in evaluating their systems once implemented. Another reason, which we argue, is the fact that the instruments are not flexible enough to be used according to the particular needs of the organization.

Specifically, the limitations are:

The instruments were developed to assess the satisfaction level of a single respondent (mainly the end user), whereas there are, in practice, different users requiring different surveying tools

The evolution of user satisfaction measurement instruments has represented incremental additions of sections to a questionnaire that facilitates its use in a research setting, usually as the dependent variable to assess information system success. However, when an organization wishes to assess the success of its information systems, it has many different users to take into account. For instance, evaluating the implementation of a low-end operational system would require the input from the end-user, or the person which has the hands on experience with the system, the department manager, who can not speak per se of the specific functions of the system, but of its impact on productivity, on meeting departmental goals, etc. At a higher level, middle management or top management can have opinions to express about the contribution of systems, both the general productivity of the firm or to their capacity to find necessary information. These different users will not only be questioned on different aspects of the system implementation, but in most instances with different types of instruments. Middle and top management, for example, will be more suitably surveyed using open-ended questions during an individual interview or focus groups.

The format of the instrument may not be well suited for all measurement exercises

The SERVQUAL instrument was developed as a paper or electronic format and is not appropriate for other types of surveying, such as by telephone, or face to face. This format is certainly the most appropriate for research purposes as it facilitates the respondent's answering at his or her own leisure and is practical for large samples. However, in an organizational setting, it may be desirable to use telephone surveys in order to increase response rate, response time and for human contact. Questions by telephone are most often shorter and stated in a multiple-choice format. As we mentioned earlier, an organization would also need to perform face-to-face interviews with more open questions for upper management.

The organizational objectives may put more or less emphasis on certain aspects

The data collected in an evaluation phase may serve many purposes. In certain cases, the data can be used to evaluate specific project leaders or teams and to attribute bonuses or perform corrective actions. In this instance, the questionnaires must focus on a particular service or product, and provide useful information for the IS personnel to make the necessary adjustments. In other cases, the IS department may want to evaluate its global image. In this case, the data need not be specifically related to a development team's performance, but more to the overall perception. Therefore, the type of measuring instruments used will depend upon the organization's objectives and how it uses the customer satisfaction data.

The elements to be measured may be related to a specific new system or software implementation, or more broadly to routine support or services provided

If the IS department wishes to collect data on a particular product, the users will be surveyed after a few months following their first use of the new product. This data will provide the information necessary to perform adjustments to the system and evaluate the implementation process. The survey is used at one point in time and questions specifically address issues such as system functionality, quality of training, quality of support. On the other hand, the IS department may require data on ongoing services and support, for all the systems used in the organization. This type of survey will be performed on a periodical basis, periods can be compared, and the data used more broadly to modify image and improve IS-user relationships.

The timing of assessments should differ depending on the individual and organizational impacts

Jurison [6] suggests that IS managers should consider short-term and long-term benefits when they develop their evaluation strategies. Not all users benefit equally from IT. The individual benefits, for instance, can be measured in the few months following implementation, whereas the organizational impacts may only be observable after a year. Therefore, the timing for individual impact evaluation and the content of the surveys should be different from the ones that assess more broader impacts.

Case study

In this section, we describe the methods used by a large IS organization to evaluate user satisfaction. This case study illustrates the measurement needs of a typical IS provider and shows how the limitations mentioned earlier apply to their specific context. We also describe how the organization went about evaluating its methods using the Augmented ISSM as a guideline. The evaluation process was as performed as follows:

1- Examination of organizational objectives

2- Examination of instruments used

Their correspondence with the organizational objectives

Their composition

3- Validation of instruments

Description of the organization and information systems effectiveness measurement

The organization studied is a provider of telecommunication solutions, data processing and systems integration and employs over 4000 systems specialists throughout the globe.

Although it provides information system services mainly to its parent company, its external clientele is increasing gradually. The surveys that were currently used to assess user (or in this case, customer was the term most often employed) satisfaction were the following:

1. *The product survey*: This phone survey was used to measure customer satisfaction for a specific deliverable, and was administered in the months following completion of the project. The content of the questionnaire was often adapted to fit with the characteristics of the related product. The respondent was either the "sponsor" or the "end-user" of the implemented product. The response rate was around 65%.
2. *The services and support survey*: This mail-out survey was used to verify customer satisfaction with respect to the service and support related to a particular system. The response rate was around 53%.
3. *The managerial satisfaction survey*: This survey took the form of an interview of middle management by the service provider's managers, on a one-to-one basis. The survey's purpose was to measure the customer's level of satisfaction of the relationship with the service provider for all systems and services. This survey was performed on a yearly basis.
4. *The general satisfaction survey:* This mail-out survey aimed at measuring the general satisfaction of customers and was completed on a yearly basis. Response rate was 43%.

The data from these surveys were used in large number of ways. Data specifically related to a recently implemented product was given to the project leader. The project leader could then take corrective action if required, either on the implemented product or on subsequent product implementations. Bonuses were also given periodically based on the results of the surveys. The overall performance of the IS organization could also be analyzed by management. Some feedback was also given to the users as to the general satisfaction levels obtained.

Evaluation of instruments

The overall objectives of the organization were to collect data on three broad components:

*Detailed Level = **"do we do it right?"***
*Decision Making Level = **"do we do the right things?"***
*Overall Perception of the Organization = **"what's our reputation?"***

If we relate the objectives stated by the IS group with the *"Augmented ISSM"* proposed by Pitt, Watson and Kavan [9], we may determine the general dimensions that should be included in each of the surveys:

Deliverable surveys ("product" and "service and support") (*"do we do it right?"*): If we do it right, then we deliver a quality product. We may therefore translate this general objective into three dimensions: *"System quality"*, *"Information quality"* and *"Service quality"*. We may also want to know how these influence *"User satisfaction"*.

"Managerial" survey (*"do we do the right things?"*): If we do the right things, we can suppose that these things have the desired impact on individual and organizational performance. This survey is therefore dedicated to dimensions such as *"Use"* (or *"Usefulness"*), *"Individual Impact"* and *"Organizational Impact"*. We will also want to know how *"Use"* influences *"User satisfaction"*.

"General" survey (*"what's our reputation?"*): If our reputation is good, customers are satisfied, loyal, and contribute to spread a good image of the IS organization. This survey is therefore mostly dedicated to the *"User satisfaction"* dimension. However, since all the components of the ISSM model are more or less related to a general measure of success, then the survey will also need to tap onto *"System quality"*, *"Information quality"* et *"Service quality"*, *"Individual impact"* and "*Organizational impact"*.

Table 1 illustrates the previous discussion, as it associates the Augmented "ISSM" model components with each of the four surveys. The most important cells for each survey to include are marked in black, while the gray cells mark indirect dimensions. A white cell indicates no association.This table indicates that the surveys, as their objectives are stated, cover together all of the dimensions prescribed by the Augmented ISSM model. Also, the surveys pursue different objectives and different dimensions and therefore very nicely complement each other.

Insert Table 1 about here

This analysis permitted the IS organization to validate its general objectives, as they could ensure that these covered the main components prescribed by the Augmented ISSM. If

these objectives had not conformed to the Augmented ISSM, then it would have been useful to question the stated objectives, identify the missing elements, and, if necessary revise the objectives. The analysis also helps to verify that the surveys correspond to their stated objective, and that they do not redundantly measure the same things.

Dimensions which were actually measured by the questionnaires

Once the general objectives of the surveys have been analyzed, the next step is to verify that the content of the surveys corresponds to the items prescribed by the Augmented ISSM model. In a table similar to Table 1, we classified each question found in the surveys according to its corresponding dimension (Table 2 illustrates this classification. The underlined questions fell into many categories). This provided a useful way to assess if 1) the questions did correspond to the constructs underlying what the survey was designed to measure and 2) that the survey was complete and addressed all dimensions that it was designed to measure.

Insert Table 2 about here

With this classification, it was possible to assess the content of each survey and verify that they complied with the stated objectives. When looking at Table 2, we observed that:

"Service and support" survey: A large proportion of the questions concerned the *"Service quality"* dimension, which is in accordance with the general objective of the survey. However, very few questions were related to *"System quality"* and *"Information quality"*. It is important that these dimensions be included even though they are measured in the "product" survey. One question measures *"User satisfaction"*, which is reasonable considering the objectives.

"Product" survey: Most of the questions here were related to *"System quality"*, which is consistent with the general objective of the survey. The same comments could be made as in the "Ongoing" questionnaire. The two other quality dimensions should have been included, particularly *"Information quality*" which is generally poorly measured.

"Managerial" survey: The largest proportion of questions here addressed the *"Service quality"* dimension, which did not appear to concur with the overall objective. Furthermore, *"Usefulness"*, which is supposed to be the most important factor according to the stated objectives, does not

relate to any question. The dimension *"Individual impact"* had only one and the dimension *"Organizational impact"* had three, which seemed to concur with the stated objectives.

"General" survey: The dimension *"User satisfaction"* was covered with thirteen questions, which is in accordance with the general objectives. However, the other questions were not equally balanced in the other dimensions: some dimensions seemed to have many (*"Service quality"* has 18) while others had none (*"Information quality"* and *"Individual impact").*

We therefore concluded that the **correspondence between the general stated objectives of the surveys and their respective content was low.** This means that the survey questionnaires, in their present form, were not very accurate at measuring what they were intended to measure.

On the other hand, there was some redundancy in questions from survey to survey, particularly for the *"Service Quality"* dimension. In general, the surveys seemed to tap onto the "quality" dimension (particularly service and product quality) more than on the level of satisfaction of customers.

Questionnaire validity and reliability

The last phase of the analysis was performed to validate the instruments in terms of construct validity, convergent validity, discriminate validity and reliability using data collected previously by the organization. If an organization does not use previously validated instruments, it is important that these validity checks be performed to ensure that the data is a correct indicator of user satisfaction. Then it can be trusted to compare with results of previous periods, to evaluate IS personnel or to improve IS interventions. We do not detail the procedures for performing this analysis, but refer the reader to other sources such [9] for further information regarding these validation methods.

Conclusion

IS departments and organizations are in great need of instruments designed to evaluate the products and services they provide. Prior research on user satisfaction measurement has developed a series of instruments that can serve as a basis for IS evaluation exercises. However, we argued that many limitations hindered the capacity of practitioners to directly use these tools in their organizational settings.

In this paper, we described an organizational setting that uses "user satisfaction" surveys to assess dimensions such as: product related satisfaction, general service satisfaction, managerial satisfaction, image, etc. The data they collected was used to give out bonuses, evaluate the IS organization and specific teams, to take corrective action to improve product quality and service. The IS organization used a variety of techniques, such as face-to-face interviews, mail surveys, telephone surveys, and these were performed at various points in time. We also described how the previously developed models, namely the Augmented ISSM, could provide a useful tool to evaluate the general strategies and instruments used by the IS organization.

Although in this particular case we evaluated existing processes and instruments, it is also possible for IS departments and organizations to develop from scratch their own evaluation methods, following a similar analytical process. The Augmented ISSM can provide guidance to define the objectives of the measurement process and the content of the instruments to be used. When developing the questionnaires, previously validated ones such as those presented in [1, 5, 7, 9] can be used and adapted to the particularities of the firm or IS product. The organization should take particular care in checking the data for validity and reliability before acting upon it or communicating it to the organization.

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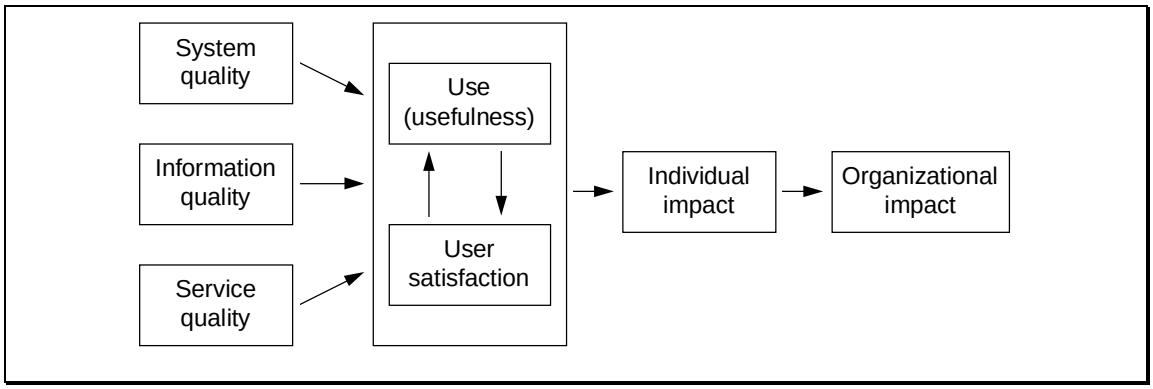

Figure 1: Augmented Information System Success Model [Pitt, Watson & Kavan, 1995]

Table 1: Objectives of each survey related to the augmented ISSM

	System quality	Information quality	Service Quality	Use (Usefulness)	User satisfaction	Individual impact	Organizational impact
"Ongoing" Objectives							
"Product" Objectives							
"Face to face" Objectives							
"General" objectives							

Table 2: Content analysis of the surveys

	System quality	Information quality	Service Quality	Use (Usefulness)	User satisfaction	Individual impact	Organizational impact	Miscellaneous
"Service and support"	4.1, 4.2, 4,5	4.6, 4.7	1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 3.1, 3.2, 3.3, 3.4, 4.3, 4.4, 4.8, 7		6	5.2	5.1, 5.2	1.6, 2.8, 3.5, 4.9, 5.3
"Product"	Q4, Q5, Q7, Q8, Q9, Q12, Q13	Q4	Q6, Q10		Q3, Q14	Q11	Q11	Q1, Q2, Q15, Q16
"Managerial"	"Quality of Solutions" "System Performance"	"Quality of Solutions"	"Quality of Solutions" "Meeting Agreed to Dates" "Responsiveness/ Cooperation" "Speed of Delivery" "Value" "People/Team" "Communications" "Ongoing Services and Support"		"Overall"	"Partnership"	"Solve business Problems" "Partnership"	
"General satisfaction"	Q30, Q31, Q32, Q33		Q4, Q5, Q6, Q7, Q11, Q12, Q14, Q16, Q17, Q18, Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27	Q8	Q1, Q2 Q3 (loyalty) Q9, Q10, Q15, Q19, Q28, Q29, Q34, Q37		Q13, Q35, Q36	Q38, Q39, Q40, Q41
Total number of questions:	**16**	**4**	**48**	**1**	**15**	**3**	**8**	**13**