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BEYOND THE STOCKROOM: USER EXPERIENCE WITH SRI LANKA'S MEDICAL SUPPLIES MANAGEMENT INFORMATION SYSTEM

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ABSTRACT

Background The Medical Supplies Management Information System (MSMIS) supports real-time medical supply-chain management at Sri Lanka's Medical Supplies Division (MSD). This study assessed user experience (UX) and associated factors.

Methods A UX assessment tool was developed from the literature, expert input and end-user discussions, then refined through a modified Delphi process across seven domains. A descriptive cross-sectional study recruited all eligible MSMIS users at MSD. UX was assessed for ten system events, and associations were tested using chi-square or Fisher's exact tests.

Results Of 130 eligible users, 120 responded (92.3%). Overall, 50 respondents (42%) reported favourable UX. Information quality scored highest (mean 4.393), while system quality scored lowest (mean 3.549), with only 28% reporting favourable experience. Across ten events, mean UX ranged from 3.86 for issuing items to 4.35 for receiving items. MSMIS training was associated with UX in eight events; age, service experience and perceived top-management commitment were associated with selected events.

Conclusion Most users reported unfavourable UX, particularly for system quality. Improving system performance, strengthening in-service training and evaluating MSMIS regularly are recommended.

Keywords: User experience; Medical Supplies Management Information System; MSMIS; Medical Supplies Division; supply chain management; Sri Lanka

1 INTRODUCTION

Sri Lanka provides free public healthcare services, and the public sector dominates inpatient healthcare delivery. The Medical Supplies Division (MSD) of the Ministry of Health is the central organization responsible for estimating, indenting, procuring, storing, monitoring, distributing and accounting for pharmaceuticals, surgical items, laboratory items, radioactive items and other medical supplies required by healthcare institutions throughout the country [1].

The Medical Supplies Management Information System (MSMIS) is an online system that enables real-time monitoring and management of medical, surgical and inventory items at connected institutions and their sub-sections [17]. During the first phase of the project, an enterprise resource planning system was customized to the Ministry's supply management practices, pilot-tested and installed at MSD warehouses, Regional Medical Supplies Divisions and line ministry institutions. The system was subsequently expanded to support a wider medical supply network.

Many methods have been developed for evaluating information systems, but no single method is considered comprehensive for all health information systems [2,4,20-22]. Evaluation of information system success is therefore a complex process. One important criterion is user experience (UX), which takes a broader view of an individual's interaction with a system, including the thoughts, perceptions and responses resulting from that interaction [10,27].

User satisfaction has often been used as a surrogate measure of information system success [9,13,20,22,23]. System quality and information quality are central dimensions of information system success [3,5,11,14-16,20-22,26]. Perceived usefulness and ease of use have also been investigated as determinants of acceptance and successful use [6,7,18,19,21,25], while computer self-efficacy may influence system use [12,24]. UX metrics provide structure to the evaluation process and can give decision-makers evidence about problems that may otherwise be based only on assumptions [8,10,27,28].

Questionnaires are commonly used to obtain self-reported measures of usability and user experience [13,28]. Existing approaches have assessed areas such as interface quality, learnability, system usefulness, information quality and overall satisfaction [8,10,27,28]. Perceived usefulness, in particular, reflects the degree to which users believe that a system improves their work and performance [7,14,18].

MSMIS is an expanding and dynamic system with an important contribution to the national medical supply chain. At the time of the study, there was no comprehensive local documented evidence assessing the user experience of MSMIS. Identifying strengths and weaknesses from the end-user perspective was therefore expected to provide useful information to system developers, medical administrators and other stakeholders.

The objective of this study was to assess user experience of MSMIS in supply chain management at the Medical Supplies Division, Ministry of Health, Sri Lanka. Specifically, the study developed a tool to assess UX for the main events of MSMIS, assessed UX using the developed tool, and determined factors associated with UX.

2 MATERIAL AND METHODS

2.1 Study design and setting

The study consisted of two components: development of a tool with a qualitative component, followed by a descriptive cross-sectional study. The second component was conducted among end-users of MSMIS at the Medical Supplies Division, Ministry of Health, Sri Lanka. The study was conducted from 25 June to 28 November 2019, with data collection from August to October 2019.

2.2 Development of the user-experience assessment tool

The principal investigator prepared an initial item list using information from the literature [13,27,28], expert opinions and discussions with MSMIS end-users from another setting. Item reduction and modification were carried out through a focus group discussion and brainstorming session with a multidisciplinary expert panel comprising information technology specialists, computer system technology leaders, a pharmacist and a medical administrator.

Seven domains that contribute to UX were identified: system quality, information quality, interface quality, learnability, user satisfaction, user expectations and perceived usefulness. Each domain contained three to six items. Questions were drafted using established principles for questionnaire construction, and each item was assessed using a seven-point Likert scale. The draft questionnaire was circulated among panel members using a modified Delphi technique for comments on wording and scoring. The final questionnaire was prepared after incorporating expert inputs.

The questionnaire was initially prepared in English and translated into Sinhala and Tamil, with back-translation into English. Judgemental validity was assessed through face, content and consensual validity. Internal consistency was assessed using Cronbach's alpha before constructing the seven domains and the overall UX measure for each MSMIS event.

2.3 Study population, sampling and data collection

The study population consisted of MSMIS end-users who were permanent employees of MSD and had at least three months of experience using the system. All users who satisfied the eligibility criteria were recruited using consecutive sampling. There were 130 eligible users.

A self-administered questionnaire was used. The first section collected general information including age, sex, education, service experience, experience with MSMIS, computer literacy, training on MSMIS and perceived top management commitment. The second section assessed UX for ten main MSMIS events: requesting/ordering items, receiving items, issuing items, returning items, estimation/consolidation, local purchasing, inventory inquiry, viewing reports, informing quality failure, and editing requests/orders.

2.4 Measurement and statistical analysis

Each questionnaire item was scored on a seven-point Likert scale. An equal-spread method was used to categorize the UX score. For association analysis, the seven categories were amalgamated into favourable UX ('sometimes good', 'most of the time good' or 'very good') and unfavourable UX (all lower categories including neutral).

Data were presented using numbers and percentages and measures of central tendency and dispersion. Associations between UX status and selected factors were assessed separately for each of the ten events because not all respondents were exposed to every MSMIS event. Chi-square tests were used for categorical data and Fisher's exact test was applied when more than 20% of expected cell values were below five. Statistical significance was considered at $p < 0.05$.

2.5 Ethical considerations

Informed written consent was obtained from participants. Ethical approval was obtained from the Ethics Review Committee of the Postgraduate Institute of Medicine, University of Colombo. Administrative permission was obtained from the Deputy Director General and Director of the Medical Supplies Division, Ministry of Health, Sri Lanka.

3 RESULTS

3.1 Development and reliability of the tool

The final tool contained seven UX domains: system quality, information quality, interface quality, learnability, user satisfaction, user expectations and perceived usefulness. Internal consistency was assessed for each domain and for the composite UX measure under the MSMIS events. The composite Cronbach's alpha values reported for the assessed events were above the minimum acceptable value of 0.700, indicating satisfactory internal consistency. For example, the composite alpha was 0.932 for requesting/ordering, 0.954 for receiving, 0.942 for issuing, 0.941 for returning and 0.947 for inventory inquiry.

3.2 Characteristics of participants

A total of 120 of 130 eligible users participated, giving a response rate of 92.3%. The mean age was 33.95 years (SD 7.36), with a range of 21 to 52 years. Twenty-nine participants (24%) were female. Most participants (91.7%, $n=110$) had studied at Advanced Level or above. More than half (56.7%, $n=68$) had more than four years of experience with MSMIS.

3.3 Overall user experience

Table 1: Overall mean scores of the user-experience domains

UX domain	Overall mean
System quality	3.549
Information quality	4.393
Interface quality	4.188
Learnability	4.060
User satisfaction	4.031
User expectations	4.146
Perceived usefulness	4.217
Overall UX	4.080

The overall mean UX score was 4.080. Information quality had the highest mean score (4.393), whereas system quality had the lowest mean score (3.549). According to the study categorization, the overall UX score remained below the favourable category, and system quality fell within the unfavourable category.

Table 2: Favourable user experience for overall MSMIS by domain

Domain	n favourable	Favourable (%)
System quality	33	28
Information quality	69	58
Interface quality	60	50
Learnability	49	41
User satisfaction	54	45
User expectations	53	44
Perceived usefulness	57	48
Overall UX	50	42

Overall, 50 participants (42%) were categorized as having favourable UX. Information quality had the highest proportion of favourable experience (58%), followed by interface quality (50%). System quality had the lowest favourable experience (28%).

3.4 User experience across MSMIS events

Table 3: User experience across the ten MSMIS events

MSMIS event	Mean UX	SD	Favourable UX (%)
Requesting/ordering	4.09	1.14	56
Receiving	4.35	1.17	61
Issuing	3.86	1.17	44
Returning	3.93	1.22	46
Estimation/consolidation	4.06	1.37	49
Local purchasing	4.23	0.92	50
Inventory inquiry	4.18	1.16	60
Viewing report	3.95	1.19	48

Informing quality failure	4.13	1.40	53
Editing request/orders	4.03	1.19	45

The highest mean UX was observed for receiving items (4.35), followed by local purchase (4.23) and inventory inquiry (4.18). The lowest mean was observed for issuing items (3.86). The proportion with favourable UX was highest for receiving items (61%) and inventory inquiry (60%), while it was lowest for issuing items (44%) and editing requests/orders (45%). Across the events, system quality repeatedly showed the least favourable experience.

3.5 Factors associated with user experience

Age was significantly associated with UX for issuing items ($\chi^2=6.73$, $p=0.009$), returning items ($\chi^2=6.55$, $p=0.011$), estimation/consolidation ($\chi^2=8.33$, $p=0.004$), local purchase ($\chi^2=6.44$, $p=0.011$), inventory inquiry ($\chi^2=8.05$, $p=0.005$) and editing requests/orders ($\chi^2=4.19$, $p=0.041$). sex was associated with UX for requesting/ordering ($\chi^2=6.47$, $p=0.010$) and viewing reports ($\chi^2=6.40$, $p=0.010$).

Service experience was associated with UX for issuing items ($\chi^2=8.96$, $p=0.003$), receiving items ($\chi^2=8.97$, $p=0.003$), returning items ($\chi^2=5.57$, $p=0.018$), inventory inquiry ($\chi^2=10.39$, $p=0.001$) and editing requests/orders ($\chi^2=6.33$, $p=0.012$).

Training on MSMIS was associated with UX in eight of the ten events: requesting/ordering ($\chi^2=9.58$, $p=0.020$), receiving ($\chi^2=11.15$, $p=0.001$), issuing ($\chi^2=3.89$, $p=0.049$), returning ($\chi^2=6.14$, $p=0.013$), estimation/consolidation ($\chi^2=8.15$, $p=0.004$), local purchase ($\chi^2=7.73$, $p=0.005$), informing quality failure ($\chi^2=4.05$, $p=0.044$), and editing requests/orders ($\chi^2=7.43$, $p=0.006$).

Perceived top management commitment was associated with UX for issuing items ($\chi^2=17.98$, $p=0.001$), returning items ($\chi^2=19.64$, $p=0.001$), estimation/consolidation ($\chi^2=15.48$, $p=0.001$), local purchase ($\chi^2=10.03$, $p=0.020$), informing quality failure ($\chi^2=10.43$, $p=0.002$), and editing requests/orders ($\chi^2=8.80$, $p=0.003$). Education, computer literacy and duration of experience with MSMIS were not associated with UX for any of the ten events.

4 DISCUSSION

This was the first documented study to assess user experience of MSMIS in supply chain management at the Medical Supplies Division, Ministry of Health, Sri Lanka. The study also developed a context-specific questionnaire covering seven domains of UX and applied it to ten main events of the system.

Overall UX with MSMIS was unfavourable among the majority of study participants. Only 42% of respondents were categorized as having favourable overall UX. Among the seven domains, information quality received the highest mean score and the highest proportion of favourable responses, while system quality consistently received the lowest ratings. This pattern was seen across most of the individual MSMIS events.

System quality is a central component of information system success [3,5,9,11,14-16,20-22,26] and has been linked with user satisfaction and system use [6,7,12,18,23-25]. In the present study, the low ratings for system quality were considered to be mainly related to system speed. This was especially apparent in events such as issuing items, returning items and viewing reports, where a large proportion of users reported unfavourable experience.

Receiving items and inventory inquiry showed comparatively better UX. For receiving items, information quality and perceived usefulness were among the more favourable domains. Inventory inquiry had one of the highest levels of favourable UX, although system quality remained the least favourable domain. These findings suggest that users recognized the usefulness and information value of MSMIS even when they were dissatisfied with aspects of system performance.

Training on MSMIS was one of the most consistent factors associated with UX, showing significant associations in eight of the ten events. Participants who had received training generally showed better UX. This may be because training improves competency in using MSMIS functions and allows users to understand the available processes more effectively. The finding is important because computer literacy and duration of experience with MSMIS were not associated with UX in any of the assessed events. Therefore, experience with the system alone may not substitute for structured training.

Perceived top management commitment was also associated with UX in several events. Management support can influence the availability of training, attention to system problems and the working environment in which an

information system is used. Previous studies have shown that organizational and system-related factors contribute to successful information system adoption and performance [9,11,15,16,19-22,26].

Age and service experience were associated with UX for several events. In some analyses, older or more experienced participants showed more favourable UX. One possible explanation is that more experienced users may compare the electronic system with the previous paper-based processes. However, these associations should be interpreted cautiously because the study was cross-sectional and event-specific sample sizes varied according to users' exposure to different MSMIS functions.

The results have practical relevance for the management of the national medical supply chain. Improving system speed and other aspects of system quality should be treated as a priority. In-service training should be provided to MSMIS users, rather than assuming that computer literacy or longer experience with the system will be sufficient. Regular evaluation of MSMIS would also allow management and developers to identify user problems as the system continues to expand.

Limitations

The study tool was validated using judgemental validity. The findings cannot be extrapolated to MSMIS end-users at hospitals because hospital users were not included in the study. In addition, MSMIS is used within the Sri Lankan medical supply context and the research design and measurement system were specific to MSD; therefore, comparative analysis with other settings is limited.

5 CONCLUSION

The developed tool demonstrated satisfactory internal consistency when used to assess the main MSMIS events. Overall user experience with MSMIS was unfavourable among the majority of study participants. Across the events, system quality had the most unfavourable user experience. UX was associated with age, training on MSMIS, service experience and perceived top management commitment for several events, while education, computer literacy and duration of experience with MSMIS were not associated with UX for any event assessed.

Engagement with system developers to improve system speed should be a key priority. In-service training on MSMIS and regular evaluation of the system at the Medical Supplies Division are also recommended.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

Statement of ethical approval

Ethical approval for the study was obtained from the Ethics Review Committee of the Postgraduate Institute of Medicine, University of Colombo, Sri Lanka.

Statement of informed consent

Informed written consent was obtained from all study participants.

REFERENCES

- [1] Ministry of Health, Nutrition and Indigenous Medicine, Sri Lanka. (2016). Annual Health Bulletin 2016. Colombo: Ministry of Health, Sri Lanka.
- [2] Ainin, S., Bahri, S., & Ahmad, A. (2012). Evaluating portal performance: A study of the National Higher Education Fund Corporation (PTPTN) portal. *Telematics and Informatics*, 29, 314-323.
- [3] Al-Mamary, Y. H., Shamsuddin, A., & Nor Aziati, A. (2014). The relationship between system quality, information quality, and organizational performance. *International Journal of Knowledge and Research in Management & E-Commerce*, 4(3), 7-10.

- [4] Ammenwerth, E., Graber, S., Herrmann, G., Burkle, T., & Konig, J. (2003). Evaluation of health information systems-problems and challenges. *International Journal of Medical Informatics*, 71(2-3), 125-135.
- [5] Cheng, Y.-M. (2012). Effects of quality antecedents on e-learning acceptance. *Internet Research*, 22(3), 361-390.
- [6] Chen, R.-F., & Hsiao, J.-L. (2012). An investigation on physicians' acceptance of hospital information systems: A case study. *International Journal of Medical Informatics*, 81(12), 810-820.
- [7] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13, 319-340.
- [8] Djamasbi, S., Li, W., Traietti, M., Tran, L. C. T., Valcour, V., Wyatt, J., & Yuan, F. (2015). Web experience and growth. *Proceedings of the Twenty-First Americas Conference on Information Systems*, Puerto Rico.
- [9] Halawi, L. A., McCarthy, R. V., & Aronson, J. E. (2008). An empirical investigation of knowledge-management systems' success. *Journal of Computer Information Systems*, 48(2), 121-135.
- [10] Hassenzahl, M. (2003). The thing and I: Understanding the relationship between user and product. In *Funology: From Usability to Enjoyment* (pp. 31-42). Dordrecht: Kluwer Academic Publishers.
- [11] Hwang, H.-G., Chen, I.-C., Chen, F.-J., & Wu, S.-Y. (2008). Factors affecting successful adoption of the application of KMS for disease classifications: A study in a Taiwanese hospital. *Expert Systems with Applications*, 34, 725-733.
- [12] Igbaria, M., & Iivari, J. (1995). The effects of self-efficacy on computer usage. *Omega, International Journal of Management Science*, 23(6), 587-605.
- [13] Bailey, J. E., & Pearson, S. W. (1983). Development of a tool for measuring and analyzing computer user satisfaction. *Management Science*, 29(5), 530-545.
- [14] Landrum, H. T., Prybutok, V. R., Strutton, D., & Zhang, X. (2008). Examining the merits of usefulness versus use in an information service quality and information system success web-based model. *Information Resources Management Journal*, 21(2), 1-17.
- [15] Lee, S.-K., & Yu, J.-H. (2012). Success model of project MIS in construction. *Automation in Construction*, 25, 82-93.
- [16] Lin, H.-F., & Lee, G.-G. (2006). Determinants of success for online communities: An empirical study. *Behaviour & Information Technology*, 25(6), 479-488.
- [17] Medical Supplies Division, Ministry of Health, Sri Lanka. (2019). MSD services information. www.msd.gov.lk. Accessed 27 November 2019.
- [18] Nasri, W., & Charfeddine, L. (2012). An exploration of Facebook.com adoption in Tunisia using Technology Acceptance Model and Theory of Reasoned Action. *Interdisciplinary Journal of Contemporary Research in Business*, 4(5), 948-969.
- [19] Park, S., Zo, H., Ciganek, A. P., & Lim, G. (2011). Examining success factors in the adoption of digital object identifier systems. *Electronic Commerce Research and Applications*, 10, 626-636.
- [20] Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information Systems*, 17, 236-263.
- [21] Petter, S., & Fruhling, A. (2011). Evaluating the success of an emergency response medical information system. *International Journal of Medical Informatics*, 80, 480-489.
- [22] Petter, S., & McLean, E. (2009). A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level. *Information & Management*, 46, 159-166.
- [23] Bokhari, R. H. (2005). The relationship between system usage and user satisfaction: A meta-analysis. *Journal of Enterprise Information Management*, 18(2), 211-234.
- [24] Ramayah, T., & Aafaqi, B. (2004). Role of self-efficacy in e-library usage among students of a public university in Malaysia. *Malaysian Journal of Library & Information Science*, 9(1), 39-57.
- [25] Shih, Y.-Y., & Huang, S.-S. (2009). The actual usage of ERP systems: An extended technology acceptance perspective. *Journal of Research and Practice in Information Technology*, 41(3), 263-276.
- [26] Urbach, N., Smolnik, S., & Riempp, G. (2011). Determining the improvement potentials of employee portals using a performance-based analysis. *Business Process Management Journal*, 17(5), 829-845.
- [27] Garrett, J. J. (2002). *The Elements of User Experience: User-Centered Design for the Web*. New Riders.
- [28] Tullis, T., & Albert, B. (2008). *Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics*. Morgan Kaufmann.