Service Quality Assessment for Information Technology Department: The Case of a Higher Education Institution in the Philippines

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Abstract

Information technology (IT) departments play a vital role in organizations. In order to attain a campus-wide quality service in higher education institutions (HEI), the department must undergo continuous improvement. This paper is about an assessment on the quality of service rendered by the IT department by identifying the key issues it faced, determining the service gaps, and measuring service efficiency. Using SERVQUAL, it was found that gap scores for all five (5) dimensions yielded negative values, showing that all customer groups of the HEI thought that the IT department does not meet their expectations most especially in terms of empathy and reliability since those dimensions posted the highest negative scores. Upon review of service requests and service level objectives (SLO), it was found that five (5) services have performed below the target of 80% efficiency. Further, several key IT issues include information security, student access, institution wide IT strategy, data-enabled institutional culture, and IT staffing and organizational models. The department was also found to have difficulty in sourcing and retaining its IT personnel especially the key positions because of the fast-paced, ever-changing nature of the IT industry. This means that the HEI should develop programs to maintain employee loyalty and attract more IT professionals to serve the academic community.

Keywords
Information Technology (IT), service quality assessment, SERVQUAL, service level objectives (SLO), service efficiency

1. Introduction

Information Technology (IT) plays a very important role in many businesses today. It is being employed in different areas of almost all sectors currently existing: manufacturing, retail and distribution, healthcare, banking, education, and others. Many companies build an IT department or at least use an IT infrastructure to reduce transaction cost [1, 2], facilitate coordination of services and scheduling to support task management [3], improve knowledge sharing, and speed up the flow of information and communication [4]. This in effect brings harmony across all departments in the company because information exchange is made more accurate and convenient to do; helping the organization attain a sustainable competitive advantage [5, 6, 7]. Studies also show that IT helps increase employees' creativity, innovation, and productivity [8, 9, 10].

The use of IT in higher education spreads across the many services that an institution offers. It facilitates openness and exchange of knowledge but requires the community to value the importance of sharing and collaboration [11]. To facilitate learning and enable faster access to information, technological innovations such as digital libraries, computer-assisted instruction, and learning management systems are being used by both students and instructors. This kind of technology has given the students an opportunity to obtain out-of-class information which in turn helped increase their motivations for learning [12]. Online registration and grading systems, on the other hand, allow faster processing of transactions, help reduce inaccuracies, provide students real time data about their performance scores

and grades, and helps parents keep track of their children's academic performance. Such systems help increase the opportunities for students to engage in improving their work and school performance [13] and for teachers or instructors, makes printing process of student reports more effective and efficient [14], that eventually may even be eliminated. IT, as generally used in operations regardless of the industry, enable information sharing across all departments in an organization [15].

The IT Department provides the information and communications technology (ICT) services in most higher education institutions (HEI). These services, contrary to common perception, are not categorized as academic and non-academic. They are categorized based on four (4) types of services such as (1) end-user, (2) development, (3) infrastructure, and (4) other services. It is therefore very important to assess how well this department provides its services to the internal customers in order to attain efficiency in operations, and for the HEI to be able to deliver the quality of education it promises to provide. The realization of how services have been delivered during operation will lead to organization's continuous improvement to achieve customer satisfaction.

2. Methodology

2.1. Conceptual Framework

The framework of this study, presented in Figure 1, study was developed based on the three (3) types of assessments made: (1) identifying the key IT issues for HEIs, (2) SERVQUAL assessment, and (3) measurement of the service level efficiency.
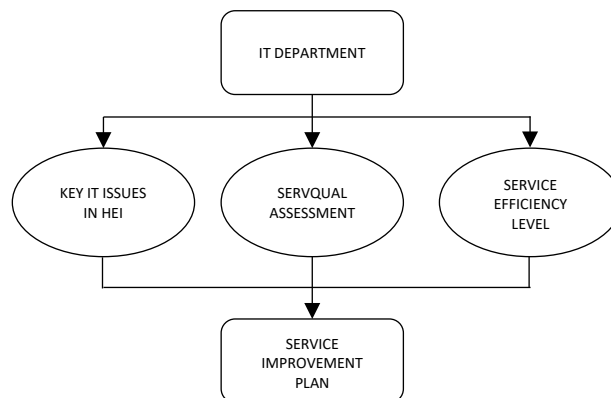

Figure 1. Conceptual Framework

The key IT issues were included as part of the questionnaire, where solicited opinions from the respondents were collected as to which services may be improved or offered by the department in the future. Likewise, several interviews with the various IT personnel were also conducted, including the Chief Information Officer (CIO) who heads the department.

2.2. The SERVQUAL Questionnaire

The use of service quality assessment tools aid organizations in measuring the quality of their service or product and one of the most notable and highly used is the Service Quality Model (SERVQUAL) developed by Parasuraman, et a. [16]. The SERVQUAL model uses quality determinants categorized into five (5) dimensions: (1) Reliability - ability to perform the promised service dependably and accurately; (2) Assurance - knowledge and courtesy of employees and their ability to inspire trust and confidence; (3) Tangibles - pertains to the physical facilities, equipment, and appearance of personnel; (4) Empathy - refers to the caring, individualized attention the firm provides its customers; and (5) Responsiveness - willingness to help customer and provide prompt service [17]. This research focused on the assessment made by the three (3) internal customers of the HEI: the students, the faculty and the non-teaching personnel. Evaluation of IT services per se is no longer advised because of the growing needs and demands of this

industry. Hochstein, et al. [18] mentioned that different services must be evaluated separately to determine core competencies of IT service providers and to manage the IT service offering portfolio. This is because customers receive a wide range of IT services and therefore it is more appropriate to assess the IT service unit rather than the actual IT service provided. Statements in the SERVQUAL questionnaire used in this research were carefully reconstructed for the respondents to rate each question with ease and understanding. The researchers reviewed the works of [18, 19, 20] in order to identify which statements would deem helpful to include in the IT-based SERVQUAL instrument.

The structure of the questionnaire consisted of five (5) parts. The first part covered the profile of the respondents such as the student's degree or program of study, the faculty and non-teaching staff's current department, and their respective years of stay or service to the HEI. The second section required the respondents to identify the type of service(s) availed from the IT department. The third and fourth sections focused on obtaining the different levels of service quality. These levels service quality defined by Kang [19] include:

(1) ideal level of IT service - the level of service IT customers (suppliers) would like to receive (provide) in order to meet the customers' requirements, based on their needs and past experiences;

(2) acceptable level of IT service - the minimum (feasible) level of service IT customers (suppliers) are willing to receive (provide) given the constraints of personnel, technology, and organizational limitations; and

(3) perceived level of IT service - the actual level of service perceived by IT customers (suppliers).

A total of 19 items on 5 dimensions were included, distributed as follows: reliability (5 items), responsiveness (3 items), assurance (4 items), empathy (3 items), and tangibles (4 items). To measure the expectations from IT services of a modern HEI against the perceived quality of services being received from the department, a five-point likert scale [21, 22] was used. In addition, the importance or weights of the five (5) SERVQUAL dimensions were computed using Analytic Hierarchy Process (AHP), a method also used in the researches of [23, 24, 25]. Table 1 exhibits the corresponding importance weights computed for each dimension.

Table 1. SERVQUAL Dimension Importance Weights

SERVQUAL Dimensions	*Importance weights*
Reliability	0.276
Responsiveness	0.222
Assurance	0.152
Empathy	0.276
Tangibles	0.074

The last part of the questionnaire solicited opinions from the customers as to which services may be improved or offered by the department in the future. The researchers also calculated the Analysis of Variance (ANOVA) for each item in the SERVQUAL questionnaire to verify if there are any significant difference among the responses of three (3) customer groups. Specifically, a one-way ANOVA was used since there is only a single independent variable.

2.3. Research Data

The Slovin's formula in equation 1, utilized in many researches [26, 27], was used to calculate the sample sizes in the three (3) different customer groups of which the margin of error used was 0.05.

$$n = \frac{N}{1+Ne^2} \tag{1}$$

Based on an estimated population of 7,000 students, 192 full-time faculty, and 283 non-teaching personnel, the sample sizes computed were 378, 130, and 166 respectively. For all customer groups, a response rate of 100% was successfully achieved which is equivalent to a total of 674 responses. The selection criteria applied for each customer group were (a) must have an active employee or student identification number and (b) must have used any of the IT services in at least one academic term.

2.4. Performance Measurement through Service Level Objectives (SLO)

Other than SERVQUAL, the department was also assessed based on its identified service quality metrics which is shown in Figure 2. The metrics are divided into three (3) areas namely Quality of Service (QoS), Quality of Experience (QoE), and Quality of Business (QoBiz).

Service Quality Metrics for IT Department		
Quality of Service (QoS)	*Quality of Experience (QoE)*	*Quality of Business (QoBiz)*
- Availability of IT services - Time required to accomplish a service	- Percentage of clients using the services - Length of usage of services - Number of clients who are satisfied	- Maintenance costs - Monitoring operational costs
Service Quality Metrics for Internal Customers		
Quality of Service (QoS)	*Quality of Experience (QoE)*	*Quality of Business (QoBiz)*
- Availability of services - Availability of equipment - Speed of network connection (wired/wireless)	- Average length of resolution time - Customer friendliness - Average length of time to wait until response - User-friendly equipment and online platforms - Performance of designated employees per department	- Maintenance cost - Equitable service - Transaction between customer and Treasury department

Figure 2. Service Quality Metrics

Actual performance data for the previous two (2) quarters, comprise of 595 tickets or requests, were collected and compared to the department's service level objectives (SLO) to measure its efficiency level. The department's goal is to achieve 80% efficiency for all IT services it offers.

3. Results and Discussion

3.1. Key IT Issues

It was identified that among the different IT services offered, the end-user services where the most prevalent during the period of this research. End-user services include user accounts, e-mail, file services, computer support, network connectivity, telecommunications, backup and recovery. These services have been utilized by the three (3) customer groups in at least once every academic term. Therefore, these services should be aimed for at least 99.90 percent uptime, or equivalent to 43.8 minutes of downtime per month [28] as it will greatly impact the overall internal customer satisfaction. Among the IT personnel, the helpdesk personnel were observed to have the greatest number of tasks being performed at hand. Also, some IT staffs who have been assigned for requests or have resolved issues tend to

overlook marking their tickets as resolved. While this particular task is seemingly inconsequential, it hampers to achieve a better rating in terms of the overall performance of the department considering efficiency and compliance.

Several key IT issues recognized include information security, student access, institution wide IT strategy, data-enabled institutional culture, and IT staffing and organizational models. Based on the data collected and information gathered through interview, it was evident that the department have been experiencing the most difficulty in sourcing and retaining its IT personnel especially the key positions because of the fast-paced, ever-changing nature of the IT industry.

3.2. SERVQUAL Assessment Results

Table 2 presents the summary of SERVQUAL assessment. It can be observed that all SERVQUAL dimensions has a gap score of negative values. This means that all three (3) customer groups think that the HEI's IT department does not meet their expectations most especially in terms of empathy since it has the highest negative score among the five (5) dimensions, with a value of -1.5824. Additionally, the internal customers think that the department's personnel does not provide them with careful personal attention. Following empathy and of the same importance weight is reliability with a score of -1.5659. The gap scores for tangibles and responsiveness comes next, with values of -1.5325 and -1.5095, respectively. The assurance dimension came in least, with a gap of -1.4054.

Table 2. Summary of SERVQUAL Gap Scores

SERVQUAL Dimensions	*SERVQUAL Score*	*Importance weights*
Reliability	-1.5659	0.276
Responsiveness	-1.5095	0.222
Assurance	-1.4054	0.152
Empathy	-1.5824	0.276
Tangibles	-1.5325	0.074

3.3. Analysis of Variance

Analysis of variance (ANOVA) for each question were also done to verify if there are any significant differences among the responses from the three (3) customer groups --- students, faculty, and non-teaching personnel. For the reliability dimension, responses for items one (1) to three (3) are significantly different since the corresponding p-values are <0.05. This means that the assessment of all three (3) customer groups for these items varies from one another. Specifically, this pertains to the IT department's commitment to deliver its services to customers within promised time; perform its services right for its customers; and make its services available to customers in promised time. The p-values for items four (4) and five (5), however, are greater than 0.05 with values of 0.521 and 0.403 which means that the responses are not significantly different among the three (3) groups. Specifically, customers have the same experience on the promised functionality of available equipment and software and how the IT personnel proactively communicates the changes and problems with its services. For the responsiveness dimension, the p-values for items six (6) and seven (7) are 0.102 and 0.051, respectively, while a value of 0.001 was obtained for item eight (8). This means that responses of the customer groups have significant differences only when there are issues with its services, the IT department's solution status is reported on promised time. For assurance dimension, p-values for items nine (9) to (11) are all <0.05, while a value of 0.085 was obtained for item twelve (12). This reveals that respondents felt that the IT services are individually adjusted to specific needs of the customer and therefore the service provider can identify what and how particular actions are to be taken for each customer needs. Measuring ANOVA for items thirteen (13) to fifteen (15) concerning the empathy dimension, with all p-values greater than 0.05, means that the assessment of all three (3) customer groups differ from each other. This signifies that they received different quality of services in terms of staff's personal attention; staff's best interest to help customers; and understanding the customers' specific needs. Finally, for the tangibles dimension, items sixteen (16), eighteen (18), and nineteen (19) yielded p-values of 0.022, 0.0014, and 0.010, respectively while item seventeen (17), pertaining to availability of advanced and state-of-the-art equipment and facilities, generated a p-value of 0.5321. This revealed that all customer groups have the same experiences on the type of equipment and facility that they utilize in the HEI.

3.4. IT Service Efficiency

The SLOs prepared by the department indicate that customer requests should be resolve in two (2) business days after its initial report or application. Among the 595 tickets reviewed for this research, five (5) services or requests were found to have performed below the target of 80% efficiency. These include desktop application support (44.44%), network connectivity (56.25%), computer support (61.29%), system access (66.67%), and desktop application development (71.43%). The most evident reason for such inefficiency rooted to lack of available guide for users and lack of helpdesk personnel to accommodate the requests. This findings were also included in the identified key issues of the IT department. It is therefore very important to ensure having an adequate workforce so that target SLOs would be achieved.

4. Conclusion

IT services have become an integral part of many organizations today, including many HEIs. Since technology is constantly evolving, there are plenty of opportunities to improve services in the field of IT in order to satisfy the growing needs of customers. This study utilized various methods of assessing the service efficiency level of the IT department in a subject HEI. The levels of services were determined using SERVQUAL assessment and review of the department's SLO. It was found that the IT department failed to provide the expected quality of service from its three (3) customer groups since the gap scores computed for the five (5) dimensions yielded negative values. Further, the insufficient number of workforce greatly contributed to poor service efficiency. This means that the HEI should develop measures or programs to maintain employee loyalty and to attract more IT professionals to serve the academic community. Further studies including other customer groups not covered in this study may be explored in the future. This may include prospective students, parents, and alumni.

References

[1] R. Howell, C. Beers, and N. Doorn, "Value capture and value creation: The role of information technology in business models for frugal innovations in Africa", Technological Forecasting and Social Change, Vol. 131, pp. 227-239, June 2018. Doi: https://doi.org/10.1016/j.techfore.2017.09.030
[2] S. Mithas, and R.T. Rust, "How Information technology strategy and investments influence firm performance: Conjecture and empirical evidence", MIS Quarterly, Vol. 40, pp. 223-245, 2016.
[3] G. Demiris, K. Washington, C. M. Ulrich, M. Popescu, and D. P. Oliver, "Innovative Tools to Support Family Caregivers of Persons with Cancer: The Role of Information Technology", Seminars in Oncology Nursing, Vol. 35, Issue 4, pp. 384-388, August 2019. Doi: https://doi.org/10.1016/j.soncn.2019.06.013
[4] S. Mitić, M. Nikolić, J. Jankov, J. Vukonjanski, and E. Terek, "The impact of information technologies on communication satisfaction and organizational learning in companies in Serbia', Computers in Human Behavior, Vol. 76, pp. 87-101, November 2017. Doi: https://doi.org/10.1016/j.chb.2017.07.012
[5] F. Okumus, "Facilitating knowledge management through information technology in hospitality organizations", Journal of Hospitality and Tourism Technology, Vol. 4, pp. 64-80, March 15, 2013.
[6] P.I. Cakmak and E. Tas, "The use of information technology on gaining competitive advantage in Turkish contractor firms", World Applied Sciences Journal, Vol. 18, pp. 274-285, 2012. Doi: 10.5829/idosi.wasj.2012.18.02.744
[7] F. Lai, X. Zhao, and Q. Wang, "The impact of information technology on the competitive advantage of logistics firms in China", Industrial Management & Data Systems, Vol. 106, pp. 1249-1271, December 1, 2006.
[8] L. Mivehchi, "The Role of Information Technology in Women Entrepreneurship (The Case of E-Retailing in Iran)", 3rd World Conference on Technology, Innovation and Entrepreneurship (WOCTINE), Procedia Computer Science, Vol. 158, pp. 508–512, 2019. Doi: https://doi.org/10.1016/j.procs.2019.09.082
[9] P. Appiahene, N. Ussiph, and Y.M. Missah, "Information technology impact on productivity: A systematic review and meta-analysis of the literature", International Journal of Information Communication Technologies and Human Development (IJICTHD), Vol. 10, pp. 39-61, 2018.
[10] A.G. Abri and M. Mahmoudzadeh, "Impact of information technology on productivity and efficiency in Iranian manufacturing industries", Journal of Industrial Engineering International, Vol. 11, pp. 143-157, 2014.

[11] F. Altinay, G. Dagli, and Z. Altinay, "The role of information technology in becoming learning organization", 12th International Conference on Application of Fuzzy Systems and Soft Computing, ICAFS 2016, Procedia Computer Science, Vol. 102, pp. 663-667, 2016. Doi: 10.1016/j.procs.2016.09.459

[12] R.C.Mishra, "Management of educational research", India: Kul Bhushan Nangia (APH Publishing Corporation), 2005.

[13] Y. T. Sung, C. N. Liao, T. H. Chang, C. L. Chen, and K. E. Chang, "The effect of online summary assessment and feedback system on the summary writing on 6th graders: The LSA-based technique", Computers & Education, Vol. 95, pp. 1-18, April 2016. Doi: https://doi.org/10.1016/j.compedu.2015.12.003

[14] S.K. Hendra, and S.K. Yulyani Arifin, "Web-based Usability Measurement for Student Grading Information System", 3rd International Conference on Computer Science and Computational Intelligence 2018, Procedia Computer Science, Vol. 135, pp. 238-247, 2018.

[15] J.D. German, M.K.T. Asuncion, and L.E. Pacheco, "Increasing productivity and efficiency for third party logistics service", Proceedings of the International Conference on Industrial Engineering and Operations Management 2019, pp. 3392-3399, March 2019.

[16] A. Parasuraman, V. A. Zeithaml, and L. L. Berry, "A Conceptual Model of Service Quality and Its Implications for Future Research," Journal of Marketing, Vol. 49, No. 4, p. 41, 1985. Doi: https://doi.org/10.1177/002224298504900403

[17] E. H. Abualsauod and A. M. Othman, "A study of the effects of online banking quality gaps on customers' perception in Saudi Arabia," Journal of King Saud University - Engineering Sciences, 2019.

[18] A. Hochstein, R. Zarnekow, and W. Brenner, Managing IT service quality as perceived by the customer: The service-oriented IT SERVQUAL", 2004. Retrieved from: https://www.researchgate.net/publication/228903894

[19] H. Kang, "Measuring the Service Performance of Information Technology Departments: An Internal Service Management Approach", Proceedings of the 10th Australasian Conference on Information Systems, 1999.

[20] W. Kettinger and C. Lee, "Pragmatic Perspectives on the Measurement of Information Systems Service Quality", MIS Quarterly, Vol. 21, Issue 2, pp. 223-240, 1997.

[21] R. Kalaja, R. Myshketa, and F. Scalera, "Service Quality Assessment in Health Care Sector: The Case of Durres Public Hospital," Procedia - Social and Behavioral Sciences, Vol. 235, pp. 557–565, 2016.

[22] V. L. Purcărea, I. R. Gheorghe, and C. M. Petrescu, "The Assessment of Perceived Service Quality of Public Health Care Services in Romania Using the SERVQUAL Scale," Procedia Economics and Finance, Vol. 6, pp. 573–585, 2013. Doi: https://doi.org/10.1016/S2212-5671(13)00175-5

[23] M. S. Alam and M. Mondal, "Assessment of sanitation service quality in urban slums of Khulna city based on SERVQUAL and AHP model: A case study of railway slum, Khulna, Bangladesh," Journal of Urban Management, Vol. 8, No. 1, pp. 20–27, 2019. Doi: https://doi.org/10.1016/j.jum.2018.08.002

[24] L. Ocampo, J. Alinsub, R. A. Casul, G. Enquig, M. Luar, N. Panuncillon, M. Bongo, and C. O. Ocampo, "Public service quality evaluation with SERVQUAL and AHP-TOPSIS: A case of Philippine government agencies," Socio-Economic Planning Sciences, p. 100604, 2017.

[25] K. Goepel, "Implementing the analytic hierarchy process as a standard method for multi-criteria decision making in corporate enterprises", Proceedings of the international symposium on the analytic hierarchy process, Kuala Lumpur, Malaysia, 2013.

[26] J. D. German and M. A. G. Catabay, "Analysis of milkfish supply chain in the Philippines: A case study in Dagupan, Pangasinan," AIP 2018 Conference Proceedings, 2018.

[27] P.B. Huang, J.D. German, R.O. Mabanag, and G. Quirino, "A quality control-based in-process artificial neural network surface roughness prediction system", Proceedings of the 2019 International Conference on Industrial Engineering and Operations Management, 2019.

[28] B. Chen, H.-P. Hsu, and Y.-L. Huang, "Bringing Desktop Applications to the Web," IT Professional, Vol. 18, No. 1, pp. 34–40, 2016.

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