

The KPI Development Framework for ICTSQ Measurement

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Abstract. This paper proposed a framework to develop Key Performance Indicator (KPI) for measuring ICT service quality (ICTSQ). In this decade, the importance of ICT cannot be denied in every stage of work by individuals, businesses or organizations. Hence, services for ICT become critical activities that need to measure from time to time to ensure the quality and advantages of ICT usage. It was proven since many researches in the concern of service quality areas including ICTSQ had discussed about the assessment, measurement and improvement of services by proposing models or frameworks to improve the service quality. However, there is still a lack of providing a quantifiable approach to measure the ICTSQ since most of the previous researches had only focused on the initial stage of service quality and ICTSQ measurement. So far, most of them had only concern on analyzing and identifying various factors and attributes of service quality based on the particular context involved. Due to this problem, it has come to the significance of this study to develop relevance KPIs for measuring ICTSQ. This paper proposed a development of KPI as a quality measurement approach for ICT services (ICTS). KPI is suggested as well as the latest and effective measureable approach for measuring performance in many aspects and contexts including in the aspect of ICT. For measuring purposes, this study reviewed the ICTS scope and ICTSQ factors based on the context involved. The investigation is done within the context of Malaysian Universities (MUs). Interviews and surveys to ICTS stakeholders are conducted within the context to gather the empirical data. The KPI development framework is hoped to give ideas and guidelines for ICTSQ measurement.

Keywords: ICTS, KPI, ICTSQ, quality factors, quality attributes.

1. Introduction

Information and Communication Technology or ICT can be defined as technology that is intended to facilitate information processing and communication functions which support activities of individual, business or organization [1], [2]. ICT services (ICTS) also, is an activity that is performed by ICTS provider through various types of ICT units to deliver the services for ICT users. In this decade, the influence of drastic dependence growth of ICT in the various sectors further creates a significant concern on improving the ICTS quality or performance (e.g. [3], [4], [5], [6]). At present, many models and frameworks have been developed in relation to the ICT and ICTS assessment, measurement and improvement in many sectors.

Though, many of these models are not focused or considered for the later stages of ICTS measurement in-depth even after various factors have been identified based on the particular context. Most previous researchers had focused on the initial stage of the service improvement study, which is determining and defining the service performance factors, which are still ongoing from time to time because of many reasons [7], [8], [9]; such as the diversity and idiosyncrasies of services [10] and the elusive nature of service quality construct [11]. For this reason, it is extremely difficult to define and measure the quality or performance of services. The lacking also happened in ICT and ICTS studies in different types of contexts (e.g. [12], [13], [14], [15]).

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An effort is made to respond to the problem relating to the ICTSQ measurement by proposing a framework to developed relevance Key Performance Indicator (KPI). It is done by considering the current scope of ICTS, ICTS quality factors and identifying relevance KPI that are based on Malaysian Universities (MUs) context. The discussion proceeds as follows. The first section as well as main discussion in this paper, highlights the framework of developing KPI as an appropriate approach of ICTS measurement. Based on the framework, the sub section; ICTS scope, quality concern and KPI development is discussed. The final section hence summarizes this study and provides recommendation on KPI development studies.

2. Framework of KPI Development

The ICTSQ refers to the performance or accomplishment of routine functioning or activities by ICTS providers to fulfill the need of ICTS users. It is measured towards ICTS service categories and develops relevance Key Performance Indicators (KPIs) for ICTSQ. The development of KPIs involves various components and parties, as depicted in Figure 1.

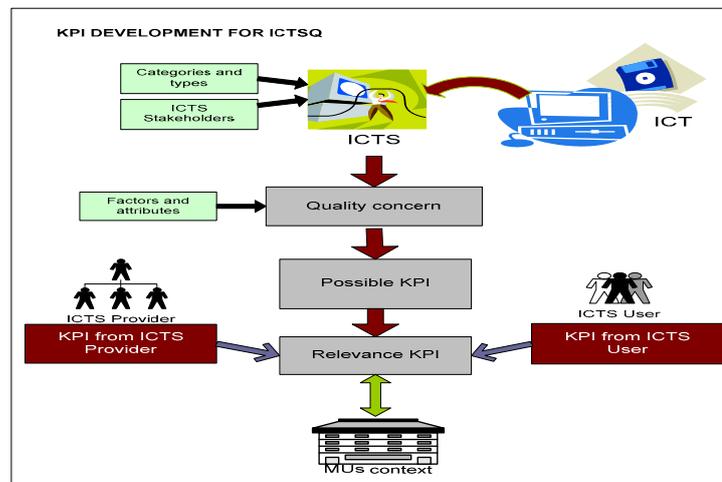


Fig. 1: The KPI Development for ICTSQ Measurement.

The three major components involved in developing KPI for ICTSQ measurement are; i) The scope of ICTS ii) Quality concern with regards to develop the KPI and, iii) KPI development by developed possible KPIs and determine relevance KPIs.

2.1. ICTS scope within MUs context

ICTS scope has been discussed through identifying the ICTS providers, ICTS recipients, ICTS categories and ICTS types [12]. Based on the researcher, ICTS providers in MUs involve main or centre provider, distributor provider, joint provider and external provider. All the categories of these providers have different characteristics, different responsibilities to provide ICTS and different focus of recipients, based on the ICTS that they is offered. ICTS users in the MUs context do include specific and general users. Within the context of MUs, the researcher in [15] initially agreed with [17] that ICTS category can be divided into three types of core services which are application system services, IT infrastructure services and IT services or support services. The researcher thus stresses that service community is also important specifically in the context of Mus.

Based on preliminary findings, there is no addition in relation to the ICTS categories [7]. In the current stage of ICTS based on MUs context, there are five categories of ICTS involved. The ICTS categories are ICT planning services, ICT application systems development services, ICT infrastructure, ICT support services and ICT community services. The complexity of ICTS categories and interaction between providers and users of ICTS regarding ICTS delivery can be seen in Figure 2.

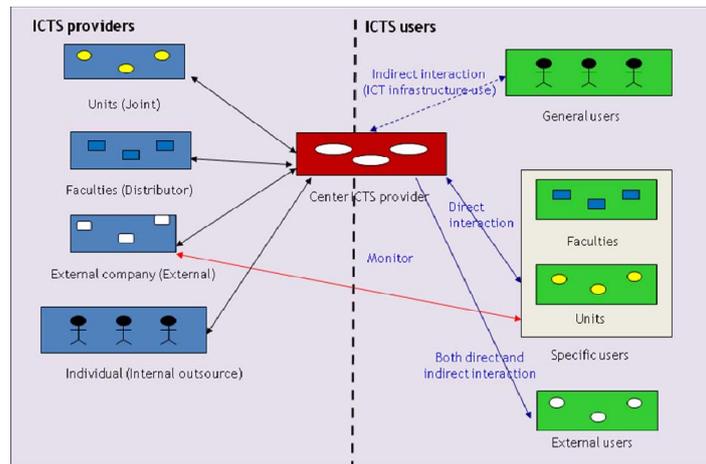


Fig. 2: General view of ICTS providers and users interactions within MUs context

As agreed with researcher in [12] there are 4 types of ICTS providers; main or centre provider, distributor provider, joint provider and external provider. Besides that, ICTS users are comprise of general users, specific users, and external users. After preliminary study conducted, an addition in the types of ICTS providers; an Internal outsource provider is found. Internal outsource provider in the MUs context mostly comes from individual or units. In the aspects of ICTS users, researcher in [13] has mentioned that society or external users can get benefits from implementation of ICTS within MUs. Based on prelim interviews, these external users can get direct and indirect benefits of ICTS. Example of external user is a person who doing intake process or checking system to local MUs platform. For each category of ICTS, various types of ICTS emerged or developed. ICTS types commonly change from time to time, based on business needs of MUs context. Table 1 shows various types of ICTS lays under 5 major ICTS categories.

Table 1: ICTS categories and examples of ICTS types within MUs context

ICTS CATEGORY	EXAMPLES OF ICTS TYPES
ICT PLANNING SERVICES	ICT strategy development ICT planning and resource developments New technology option 'evolution' (technology roadmap) Planning for new ICT service development
ICT APPLICATION SYSTEMS SERVICES	Application system development System analysis System design Package evaluation System implementation Monitoring the service given by external providers**
ICT INFRASTRUCTURE SERVICES	Managing faculty email services Installing and managing network services Monitoring the service given by external providers** Managing ICT security**
ICT SUPPORT SERVICES	Help desk service Technical support services ICT training Hotline services**
ICT COMMUNITY SERVICES	State web site services External information supply (e.g. zakat centre, school in state) ICT facilities rent (e.g. LCD, computer facilities)** Web access for external users ** ICT training for government servant s** Place or room rented for training**

** Some new ICTS types within ICTS categories in preliminary findings

2.2. Quality concern for ICTS

The quality concern for ICTS is focuses on quality factors and quality attributes for each ICTS categories. A quality factor in this study is defined as a measurement for ICTS to indicate the achievement or performance from the evaluation of the performance score given (e.g. numbers, percentage). Each factor may have the particular aspect for measuring the performance based on the determined metric, which is called

quality attribute. Quality factors and attributes is reviewed from previous literature and validated by practitioners during preliminary study. Table 2 depicts the quality attribute of quality factors for ICT Infrastructure services.

Table 2: Examples of Quality factors and attributes for ICT Infrastructure services

ICT INFRASTRUCTURE SERVICES	
Quality factor	Quality Attributes
RELIABILITY	<ul style="list-style-type: none"> - The ICT services are carried out as required by the recipient - The ICT is carried out properly, professionally, completely and tidily - The ICT service that provided to recipient is critically for them
DOCUMENTATION	<ul style="list-style-type: none"> - The ICT services provide documentation which can be used as formal evidence; clarify the confusion; as references for new staff in making the maintenance process faster
MAINTENANCE	<ul style="list-style-type: none"> - The ICT service providers should monitors the provided ICT service in order to ensure that the periodical maintenance is done - The services recovery gets immediate response or quick reaction from the ICT service providers
AVAILABILITY	<ul style="list-style-type: none"> - The ICT services provides a stand-by staff to supervise the service operation (especially over working time) - The ICT services should provides effective new technologies (e.g. audio video hardware, cctv, wireless coverage, smart card etc) to facilitate the service recipients in their work
SAFETY	<ul style="list-style-type: none"> - The need of ICT service providers introduce or spread the policy information to recipients, being strict on the policy enforcement - The ICT service is safe from the virus threat, attackers, computer crime, power misconduct and, physical and environment threat
SERVICE MARKETING	<ul style="list-style-type: none"> - The ICT service providers promote the service offered, ensures that service recipients understand the usage and benefits gained from the provided services - The ICT service provides the information from the aspect of usage guidance, services status, enhances the user knowledge

2.3. Development of KPIs

For the purpose of measuring ICTSQ, this study has suggested the development of KPI as well as the latest and effective measureable approach to measure the performance of individuals, businesses and organizations and also in the aspects of services. Besides, KPIs applied as basic elements in many measurement and assessment frameworks and systems such as International Organization for Standardization (ISO), IT Infrastructure Library (ITIL), Control Objectives for Information and related Technology (COBIT) and, Balance Score Card (BSC) and also implement in many organizations in many countries including Malaysia. The Key Performance Indicators (KPIs) development is the primary contribution in this study to measure the performance of ICTS. National Institutes of Health (NIH) defines the performance indicator as a description of what is to be measured, including the metric to be used, the scale, formula to be applied and the conditions under which the measurement will be taken. [18].

Based on this study, in order to get relevance KPIs for measuring ICTSQ, KPIs that suggested from ICTS providers and users is analyzed. Then, lists of proposed KPIs for each category of ICTS were given to both ICTS stakeholders; ICTS providers and ICTS Users. The survey is conducted through questionnaire distribution to get the level of relevancies for the proposed KPIs based on context involved. Table 3 depicts a list of relevance KPIs for ICTS under the category of ICT Infrastructure Services.

Table 3: Relevance KPI for ICT Infrastructure Services

ICT INFRASTRUCTURE SERVICES	
QUALITY FACTOR	SOME EXAMPLES OF KPI
RELIABILITY	<ul style="list-style-type: none"> • % of various complaints received towards ICT services • % of user requirements fulfilled for ICT services
DOCUMENTATION	<ul style="list-style-type: none"> • % of complete documentation for ICT services
MAINTENANCE	<ul style="list-style-type: none"> • % of recovered for ICT services • % of yearly periodical maintenance implemented for ICT services
AVAILABILITY	<ul style="list-style-type: none"> • % of stand-by staff allocated for ICT services • % of automated monitoring available for ICT services that should have monitored continuously

SAFETY	<ul style="list-style-type: none"> • % of policy information spread towards ICT services • % of incidents towards ICT services
SERVICE MARKETING	<ul style="list-style-type: none"> • % of promotion for ICT services

3. Conclusions

For the purpose of developing KPI for ICTSQ measurement, it is suggested to review in relation to the ICTS scope based on this age. The essential to review ICTS scope is because of the complexity in measuring ICTS since the ICTS itself is diverse, idiosyncrasies, clearly complex and continually changing from time to time based on context involved. This study gives an idea and awareness to importance parties in MUs, related to the ICTS scope and quality factors that are involved for ICTS measurement. Further, this study provides a set of guidance in order to measure the ICTS by providing a list of relevance KPIs. It also assists other researchers within this area of study by providing a framework of KPI development for measuring the ICTS from the methodological aspects.

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