

IT SERVICE MANAGEMENT: TOWARDS A CONTINGENCY THEORY OF PERFORMANCE MEASUREMENT

Completed Research Paper

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Abstract

Information Technology Service Management (ITSM) focuses on IT service creation, design, delivery and maintenance. Measurement is one of the basic underlying elements of service science and this paper contributes to service science by focussing on the selection of performance metrics for ITSM. Contingency theory is used to provide a theoretical foundation for the study. Content analysis of interviews of ITSM managers at six organisations revealed that selection of metrics is influenced by a discrete set of factors. Three categories of factors were identified: external environment, parent organisation and IS organisation. For individual cases, selection of metrics was contingent on factors such as organisation culture, management philosophy and perspectives, legislation, industry sector, and customers, although a common set of four factors influenced selection of metrics across all organisations. A strong link was identified between the use of a corporate performance framework and clearly articulated ITSM metrics.

Keywords: IT Service Management, Contingency Theory, Content analysis, IT Infrastructure Library, Performance measurement, Service science

Introduction

Service Science is an emerging cross-disciplinary approach based on three foundational concepts: service systems, value propositions, and governance mechanisms (Spohrer & Kwan 2009). The basic underlying elements of service systems are value, stakeholder perspectives, measures, and resources. Checkland and Holwell (1997) view all information systems as service systems, and Information Technology Service Management (ITSM) can be viewed as a subset of Service Science (Galup et al. 2009). ITSM focuses on IT service creation, design, delivery and maintenance. In contrast to the traditional technology-oriented and system-focused approaches to IT, ITSM is a discipline for managing the IT function as a service function. ITSM is a customer-oriented approach to managing IT services that focuses on the management of end-to-end processes.

This paper focuses on ITSM performance measurement. In the context of Service Science, measures such as quality, productivity, regulatory compliance, and sustainable innovation are used to track improvements in service system performance over time, as well as to compare alternative designs of service systems and service value networks (Spohrer and Kwan 2009).

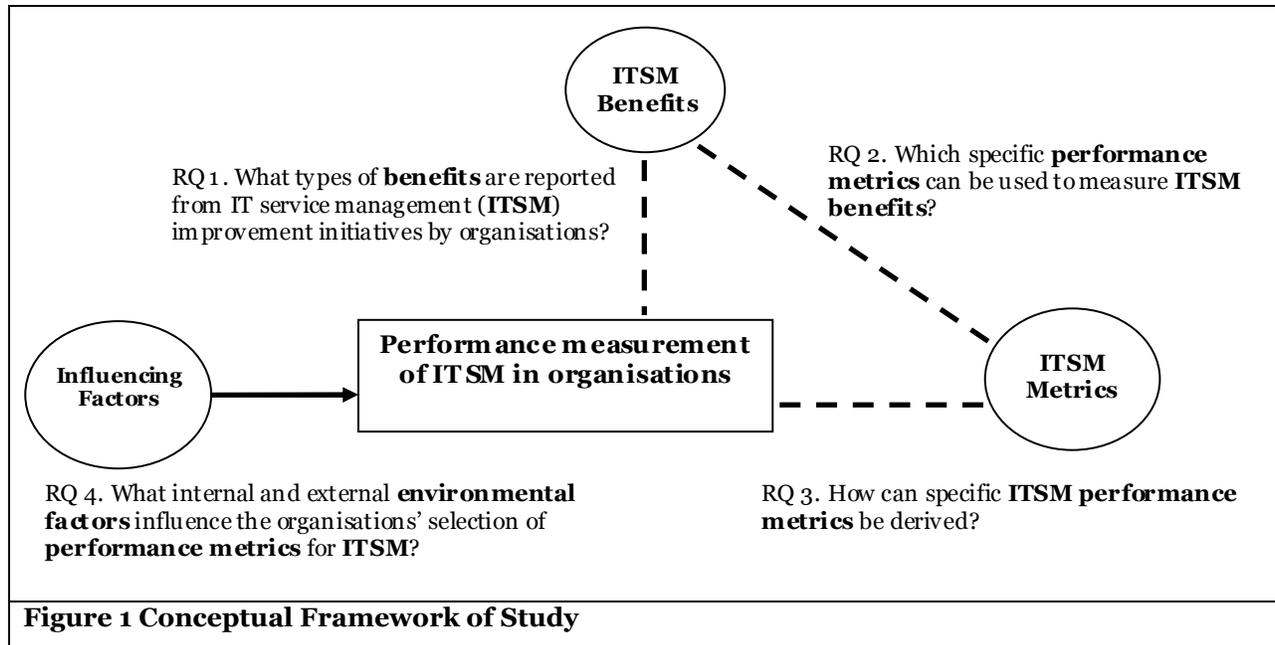
Performance measurement is an essential aspect of effective IT Service Management. Despite the widespread adoption of frameworks such as the IT Infrastructure Library (ITIL®), many IT service departments and providers find it difficult to implement a performance measurement framework. Lahtela et al. (2010) suggest the difficulties arise because Information Systems (IS) organisations do not have a structured approach for measuring IT services and service management processes, the tools used by IT service support teams are not effective, there are insufficient practical examples provided with ITSM standards and frameworks, and there are too many options of what to measure.

A review of the existing empirical literature reveals a gap in research in ITSM performance measurement. To address this challenge, the University of Southern Queensland in collaboration with industry partners, Queensland Health and IT service management forum (itSMF) Australia, is conducting a government-funded study to develop a performance measurement framework for ITSM as depicted in Figure 1. The project aims to improve crucial IT resources management in private and public sector organisations. The first stage of the project revealed that although the widely used ITIL books provide advice on suitable ITSM metrics, many ITSM practitioners report difficulties in identifying and implementing a performance management framework (Gacenga et al. 2010). The inability of practitioners to apply ITSM performance measurement advice in practice prompted the second stage of the project to investigate the factors influencing the selection of metrics.

In this second stage of the project, content analysis of interviews conducted at six organisations is used to answer the research question: *What internal and external environmental factors influence organisations' selection of performance metrics for ITSM?*

In December 2009, a survey of itSMF Australia members was conducted to ascertain the type of benefits accrued from ITIL (RQ1) and the metrics currently used (RQ2). This was followed in 2010 by a series of in-depth case studies of private and public sector organisations, undertaken to fully answer RQ3: *how can specific metrics used to measure ITSM performance be derived?* and RQ4: *what internal and external environmental factors influence the organisations selection of specific performance metrics for ITSM?* The aim of this paper is to present the results pertaining to RQ4. The survey conducted in 2010 reported high levels of variation in ITSM performance metrics in use by practitioners (Gacenga et al. 2010).

Critical contingencies such as managers' individual preferences and organisational factors identified by Saunders and Jones (1992) in relation to IS function performance can be applied to ITSM. Researchers and practitioners are urged to recognise contingencies affecting the selection of performance metrics. In order to provide a theoretical foundation for the study, contingency theory of organisations is applied. The contingency theory of organisations is described as a loosely organised set of propositions which endorse the view that there are no universally valid rules of organisation and management (Luthans 1973; Rejc 2004). The contingency theory of management was extended to performance measurement by Rejc (2004) based on her view that no universally appropriate performance measurement system exists for all organisations and in all circumstances.



The paper is organised as follows. Following a literature review on contingency theory and key concepts of service management and performance measurement, we describe the methodology for the case studies, then report the results and discuss the findings in relation to the research question. A comprehensive set of ITSM performance dimensions and a contingency theory for selecting appropriate measures is presented. Finally the conclusion summarises the results, limitations and proposes future work.

Literature Review and Related Studies

In this section we review relevant literature on contingency theory and ITSM performance measurement.

Environment Factors Influencing the Selection of ITSM Performance Metrics

Previous literature on ITSM has mainly focused on ITSM adoption and benefits (Gacenga et al. 2010). To date, few studies have addressed the area of performance measurement of ITSM. In fact, we were unable to locate any ITSM studies focused on the factors that influence the selection of performance metrics. Recent studies and publications have proposed ITIL performance metrics (Barafort et al. 2005; Brooks 2006; Smith 2008; Steinberg 2006; van Grembergen et al. 2003), IT service performance and quality measures (Hochstein 2004; Praeg and Schnabel 2006), business value of ITIL (itSMF Germany 2008; Moura et al. 2006; Šimková and Basl 2006; Yixin and Bhattacharya 2008), and ITIL process capability and maturity assessment (itSMF International 2008; Valdés et al. 2009). One study developed software for measuring ITIL process performance (Lahtela et al. 2010) and two studies proposed evaluation frameworks for ITIL (Hochstein et al. 2005; McNaughton et al. 2010). None of these studies reviewed have specifically addressed the internal and external environmental factors influencing the selection of the ITSM performance metrics.

Contingency Theory

There are a number of reasons why contingency theory was selected for the study. Contingency theory “enables a researcher to relax assumptions underlying theoretical propositions and/or systematically introduce factors to explain or predict expected phenomena” (Umanath 2003). Services, including IT services are created and consumed simultaneously and in many services the customer is a co-creator (Gronroos 2000; Normann 2000). It is therefore important to understand how the environment influences the management of IT as a service. Contingency theory is based on the premise that there is no universally appropriate performance measurement system that applies equally to all organisations in all

circumstances. Using the contingency theory may lead to a better understanding of ITSM performance measurement by enabling the identification of “specific aspects of a performance measurement system that are associated with certain defined circumstances” (Rejc 2004).

Previous studies on ITSM adoption, benefits and performance measurement have used a variety of theories, such as actor network theory (Cater-Steel and McBride 2007) institutional theory (Cater-Steel et al. 2009), resource based view (Wagner 2006), theory of normatively regulated activity (Donko and Traljic 2006) but none of the studies to date have used the contingency theory of management. A meta-analysis of theories used in previous ITSM studies that have developed ITIL performance measurement frameworks is summarised in Table 1.

Table 1. Meta-analysis of ITIL performance measurement studies				
Authors	Research Approach	Underlying Model	Theory/	Study main purpose
Hochstein (2004)	Qualitative (Case Study)	SERVQUAL and SERVQUAL	IT	Quality of IT individual services
Praeg and Schnabel (2006)	Theoretical (literature review), market acceptance survey	Value based management		IT services procurement
Donko and Traljic (2009)	Theoretical (Literature review)	BSC, activity diagrams		Explaining measuring quality through variation in service level and business loss, number of transitions of activity
McNaughton et al. (2010)	Design science	IS SERVQUAL and Reverse SERVQUAL	IS	Building a framework for measuring benefits and value of ITIL

Contingency theory has been used in previous studies that focused on IS. Using contingency theory, Saunders and Jones (1992) provided a model of important dimensions and measures for evaluating IS performance. Their work was extended by Myers et al. (1997) to assess the quality and productivity of the IS function. The two studies identified the following internal and external organisational factors influencing the selection of performance dimensions:

Internal environment factors: mission, size, goals, top management support, IS executive hierarchical placement, maturity of IS function, size of IS function, structure, management philosophy/style, evaluator perspective, culture and IS budget size.

External environment factors: industry, competitive environment, culture, economy, availability of resources, and climate.

In an earlier study on the organisational context of IS success, Raymond (1990) proposed a contingency approach relating organisational factors to user satisfaction and system usage. We apply contingency theory in the ITSM context which focuses on IT services and apply the factors identified in the previous IS function study by Myers et al. (1997).

Our research addresses the criticisms levelled at contingency theory application in Management Information Systems (MIS) and follows the advice by Weill and Olson (1989): “A generally more subjectivist, less functional, less un-reflexive and less deterministic approach is needed ... An increasing use of case study methodologies, longitudinal research and ethnographic approaches is suggested”. This second stage of the project investigates the contingent environmental factors, such as organisation size, industry sector and strategy that influence selection of performance metrics for ITSM.

Importance of performance metrics in ITSM

Previous studies on the performance measurement of ITSM have not given consideration to the factors that influence the selection of ITSM performance metrics. The first stage of the project established that despite the proliferation of ITSM metrics, ITSM practitioners are faced with challenges measuring

performance and the majority do not use a structured performance measurement framework (Gacenga et al. 2010).

The majority of organisations implementing ITSM frameworks are perceived to be at a low level of maturity and are therefore not at the stage of systematic performance measurement (Cater-Steel et al. 2011; Marrone and Kolbe 2010). As the process capabilities of organisations implementing ITSM frameworks improve and as the level of maturity of the organisations increases it is critical that the factors that influence the selection of ITSM performance metrics are understood.

Extending the findings on IS performance measurement to ITSM performance measurement, refinements of measures of performance are badly needed (Saunders and Jones 1992). It is further advised that cross-sectional studies on measures being used “can be examined to determine what organisational and environmental contexts and groups of dimensions and measures actually seem to work best. These studies would be complemented by the use of in-depth interviews and content analysis of organisational documents” (Myers et al. 1997). Our ITSM performance measurement study applies the advice from prior studies that used contingency theory. In our application of advice from prior studies we recognize the IT advances and changes (e.g. Internet usage, Cloud Computing, Service-Oriented Computing) that have occurred and continue to occur and that have necessitated the shift by IT departments to a customer instead of a technology focus. A report on public sector organisations in Australia found that “there is no evidence that current investment approval processes include any rigorous and objective methodology for assessing the organisational capability of an agency seeking funding for ICT-enabled projects during the budget process” (Gershon 2008). This was recently confirmed by Reinecke (2010) who found that “there was no formal means of assessing whether agencies had the capability to commission, manage and realise benefits from ICT projects”. Poor choice of metrics could lead to difficulty in aligning and integrating the IS function with the organisation. Lack of metrics could result in failure of IS and business operational systems and jeopardise achievement of corporate goals. ITSM frameworks such as ITIL prescribe best practices founded on the concept of continual improvement which must be based on performance measurement.

Method

Case studies are used in this research as they provide an “empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context especially when the boundaries between the phenomenon and the context are not clearly evident” (Yin 2009). ITSM performance measurement is a contemporary phenomenon with ITSM practitioners experiencing challenges despite the availability of performance measurement metrics. The benefits and key performance indicators for ITSM as well as the issues of performance measurement are unclear.

Six case study organisations were purposively selected from the 263 stage one survey respondents. We used purposive sampling based on specific purposes associated with answering a research study’s question (Teddlie and Yu 2007). This type of sampling is useful for acquiring information that cannot be sourced as well from other choices. The aim of the sampling was “to achieve comparability across different types of cases on a dimension of interest” (Teddlie and Yu 2007). The criteria for selection was organisations that had identified ITSM benefits and performance measurement and represented a mix of public and private sector, large and small size, profit and not-for-profit and from a wide geographic area, drawn from three Australian state capital cities. Following a pilot case study, interviews were conducted with six organisations in Australia.

Each case study followed a protocol comprising the following steps: planning, data collection, data analysis, development of a case study report and validation of the report (Neale et al. 2006; Tellis 1997). We developed the case study interview questions from the stage one survey findings and literature reviewed. The interview questions were appraised by a panel of three academic and two industry experts. We used structured interviews for data collection as they are identified as an effective tool for measuring subjective variables as advised by Foddy (1993): “Asking questions is widely accepted as a cost-efficient (and sometimes the only) way, of gathering information about past behaviour and experiences, private actions and motives, and beliefs, values and attitudes”. To ensure that the questions were well structured we evaluated them using Belson’s (1981) sixteen categories. The interview questions are provided in Table A1 in Appendix A.

We use content analysis following advice of previous studies (Myers et al. 1997). The descriptive and normative responses to the case study interview questions are amenable to content analysis (U.S. General Accounting Office 1996). Content analysis enables a systematic, replicable technique for compressing the interview transcripts into the environmental factors based on explicit rules of coding (2004; Weber 1990). The content analysis follows the ‘seven step’ guidelines summarised by the U.S. General Accounting Office (1996). Cross-case analysis is used to aggregate the metrics and methods from the six organisations and integrate the findings of the case studies with survey results and literature to identify the factors that determine the organisations’ choice of appropriate performance metrics for ITSM. Conducting a cross-case analysis helps derive theoretical insights which arise from methodological rigor and multiple-case comparative logic (Eisenhardt 1991). Each case study interview was conducted by two researchers and audio recorded, transcribed and checked by the researchers and interviewees.

Data Analysis

The subject of interest in this paper is the performance measurement practice of ITSM practitioners, specifically the internal and external factors that influence their selection of ITSM performance metrics.

According to Luthans and Stewart (1977) the formulation of a general contingency theory of management “must start with a sound construct of the organisation system”. They identify environmental variables as factors beyond the control of the organisation’s resource managers that impact the organisation. They distinguish between external factors, defined as outside the organisational system, and internal factors, which are outside the control of the specific manager (in this context the ITSM manager) but within the organisation. The content analysis answered the six questions shown in Table 2 that, according to Krippendorff, must be addressed in every content analysis (1980).

Table 2 Content Analysis Criteria	
<i>Which data are analysed?</i>	Interviewee responses and organisation information on factors influencing the selection of ITSM performance metrics
<i>How are they defined?</i>	Internal and external factors from a general contingency theory of organisations
<i>What is the population from which they are drawn?</i>	Case study survey responses, interview transcripts and documents
<i>What is the context relative to which the data are analysed?</i>	The contingency theory of management and ITSM
<i>What are the boundaries of the analysis?</i>	Organisations implementing ITSM performance measurement
<i>What is the target of the inferences?</i>	Identification of external and internal environment factors influencing the selection of ITSM performance metrics.

Textual materials used in the analysis include the case study survey responses, interview transcripts and documents from the case study organisations. Five of the organisations provided internal documents and a demonstration of the performance measurement systems in use.

We defined the context units as the entire case study interview and documents. Recording units were defined syntactically using the separations created by the respondents (Stemler 2001). The recording unit selected is the interview question responses addressing internal and external environmental factors that influenced the selection of ITSM performance metrics.

We focused on the presence of variables, their frequency and allocated space and time. Each variable was allocated to a category (Weber 1990). We used two *a priori* categories from the contingency theory of management: internal environment and external environment. The selected categories were mutually exclusive and exhaustive (Krippendorff 1980).

The internal and external environmental factors identified Saunders and Jones (1992) and Myers et al. (1997) were used as tags for segments of text. Coding of interview transcripts was done manually. Stability, whereby the same coder achieves the same results time after time, and reproducibility, in that different coders using the coding scheme classify the text into the same variables, were measured. After developing the coding scheme we trialled it on the pilot case study. To achieve reliability, four researchers

using the same coding scheme tagged the text. We then organised the research team so that the primary researcher performed analysis on the six case study interviews and organisation documents while the other three researchers each separately analysed two different case studies. Once this was complete the primary researcher met with each of the other researchers. During the meeting the two sets of analysis, one from each researcher, were compared and where there were differences a consensus was reached. A summary of factors was compiled by counting the frequencies and finding associations between variables. This process was achieved by first marking the coded text against the variables, then mapping the variables to the identified factors from prior research and naming emergent factors.

Multiple sources were used to ensure validity by triangulation: the stage one survey responses, case study interviews and cross-case analysis. We recognise the challenge of demonstrating validity in case studies as noted by Ryan and Bernard (2003) “there is no ultimate demonstration of validity, but we can maximize clarity and agreement and make validity more, rather than less likely”.

Results and Discussion

Interviews were conducted at two organisations in each of three Australian states. All the organisations in the case study were implementing ITIL. The profiles of the six organisations selected for case study are presented in Table 3. The case study interviewees were directly involved in ITSM implementation, management, performance measurement and reporting. They held a wide range of ITIL process roles. The interviewees were drawn from middle and operational levels of management.

Case	Position of Interviewees	Type/ Owner	Business Sector	Total Staff	Annual Turnover	Years
A	Director Client Services	Public	Administration - IT Managed Services Provider	200 to 999	\$5 to \$9 Million	4
B	Director Service Planning and Performance, Manager	Public	Health	> 10,000	> \$150 Million	8
C	Quality Assurance and Certification Manager	Private (Australian / Foreign)	IT Managed Services Provider	> 10,000	> \$150 Million	7
D	Business Integration Manager, Service Level Manager, Service Management Office Director, IT Corporate Services	Public	Education	5,000 to 9,999	> \$150 Million	4
E	Professional Services Manager, Operations Reporting Analyst, Project Office Manager, Operations Manager	Private (Australian owned)	Not for Profit	200 to 999	> \$150 Million	3
F	IT Service Desk Manager	Private (Australian owned)	Health and community services	2,000 to 4,999	> \$150 Million	1

Note: n – Number of interviewees; years – ITSM adoption duration

Findings

This section presents the internal and external environment factors influencing the selection of ITSM performance metrics that emerged from the content analysis. The findings for each of the six cases are reported then the findings of the cross case analysis are outlined. For ease of reference, quotations from the survey responses are indicated by ‘SR’ and interview quotations are shown with transcript line numbers ‘TL’.

Case A – Public Sector Managed Service Provider

Organisation A had been using ITIL for four years and at the time of the interview was undergoing organisation structure changes. Case A had primarily implemented ITIL version 2 and had the following processes in place: incident management, problem management, configuration management, change management, service desk function, service level management, and IT service continuity management. The sequence of the first three ITIL processes implemented was incident management, change management, problem management. Case A had also implemented PRINCE2® and CobiT®. Case A did not have a formalised performance measurement framework for ITSM but had a formal management reporting framework based on a modified Balanced Scorecard (BSC). Elements of ITSM were reported through the BSC. The modified BSC had been in use for two years. The organisation reported ITIL process benefits including an efficient way to monitor issues, assurance that business will still run after change had been implemented and having one central location that all customers can call. Examples of ITSM performance metrics included number of incidents, trend analysis, number of known errors, number of problem records and number of failed changes. Metrics were recorded and reported at the operational level for incident and problem management processes while change management metrics were recorded weekly and reported quarterly at the tactical level. The service desk function metrics were recorded and reported monthly at the operational level. Challenges experienced by Case A included “*accurate record keeping and technical limitations*” (SR ID #199), while reporting challenges included “*technical limitations and meaningful reports*” (SR ID #199).

In Case A, the main internal environmental factor influencing the selection of ITSM performance metrics was organisation culture: “*I have worked here for a long time ... where crisis management is the preferred modus operandi*”, “*the only reason I capture this stuff is so that somebody else can report it to the executive*” (TL #143, #422). The main external environmental factor was external customers: “*we have a reporting framework and method with our customers*” (TL #52). The organisation’s performance measurement framework also influenced selection of ITSM performance metrics.

Case B – Public Sector Health Organisation

Case B previously used the BSC as its performance measurement framework but following a series of changes in Chief Information Officers (CIOs) its use tapered off. The organisation was considering reviving use of the BSC. Case B had implemented ITIL version 2 over eight years. The following ITIL version 2 processes had been implemented: incident management, problem management, configuration management, change management, release management, service desk function, service level management and capacity management. The sequence of ITIL process implementation was incident management, change management and configuration management. Case B has also implemented ISO/IEC 20000, ISO 9000, PRINCE2 and CobiT.

In Case B, CIO influence was the primary internal environment factor influencing the selection of ITSM performance metrics. ITSM tools and internal customers were also influencing factors. To a minor extent legislation was the only external environment factor influencing the selection of ITSM performance metrics: “*So the CIO is basically setting his requirements for what we report on and then feeding those up into an organisational report*”, “*The CIO basically looked at the BSC and said ‘this is not’ [what I want]*” (TL #185, #500).

Case C – Partially Australian Owned Managed Services Provider

This organisation used a combination of frameworks and standards to measure the performance of ITSM. The organisation has implemented ITIL version 2 in the past seven years but had also recently implemented ITIL version 3. The following ITIL version 2 and 3 processes had been implemented: incident management, problem management, configuration management, change management, release management, service desk function, service level management, IT financial management, capacity management, availability management, IT service continuity management and supplier management. The ITIL processes were implemented in groups. The first group comprised incident, problem, change, configuration, and service desk function followed by the second group: release, service level management, capacity, availability, and supplier management, followed by the third group: IT financial management and IT service continuity management. Case C also implemented CobiT, ISO/IEC 20000, ISO 9000, parts

of ISO 27001-001, 14001 and 18001, Six Sigma, Organisation Health and Safety and parts of CMMI®. The BSC and the IT BSC were also being implemented along with ISO 15504 and maturity assessment for standards and processes. Reduced rework and increased customer satisfaction were listed as the benefits from ITSM. Incident management was measured daily and reported monthly at the strategic level. Problem management was measured monthly and reported quarterly at the strategic level. Configuration management was measured daily and reported quarterly at the strategic level. Change and release management were measured daily and reported monthly at the strategic level. A key measuring challenge was *“agreeing on what should be measured”*, while a key reporting challenge was *“what should be reported from all the metrics supplied”* (SR ID #11).

The IS function structure was the main internal environment factor influencing the selection of ITSM performance metrics. *“Yeah, but that’s the organisation structure. So these are the support functions that sit within it. You have a business improvement team that sits across that and that they feed into lines of service ... It’s matrixed, highly matrixed”* (TL #140). The major external environment factor influencing the selection of ITSM metrics was requirements of external customers: *“to give clients the idea that we have external people looking at us, we have metrics that are driven by those externals”* (TL #36).

Case D – Public Sector Education Provider

This organisation was measuring some of its implemented ITSM processes such as change management. The organisation had been using a maturity assessment framework through a consultant since 2007. The organisation had implemented ITIL version 2 for four years. Incident management, change management, release management, service desk function and service level management had been implemented. The first three processes were implemented in the following sequence: incident management, change management, release management. PMBOK and IT BSC were also being implemented. Some of the benefits from the ITSM implementation included: certainty of outcome from incidents, higher availability, single point of call, fast call resolution, and shared expectations of service. ITSM performance metrics in use included: mean time to restore, first call, timeliness by work unit, misclassification, and process avoidance by work unit. Incident management, change management and release management were measured monthly and reported quarterly at the tactical level. A key measuring challenge was disparate metrics systems, while a key reporting challenge was getting senior managers to take action on measures.

CIO influence was a key factor influencing the selection of metrics *“I’m pretty sure our CIO now doesn’t like that. He just wants the figures.”* (TL #904), *“So this is a very small sample of data which I just used to show our CIO because he said, ‘I want a report which looks like this’ and he drew it and said, ‘that’s what it looks like’.”* ITSM tools were also a key internal environment factor influencing the selection of ITSM performance metrics. *“Well here are the reports the software provides out of the box. In maybe, 95% of the cases that seems to meet our needs”* (TL #588). Industry sector was an important external environmental factor: *“we are just focusing on what is the best practice out in the industry”*, *“From an external point of view, I think that at the time in 2007 what influenced it was listening to what a lot of other industry organisations were doing”* (TL #27, line #194). Legislation was to an extent an external factor: *“we’ve been audited by the Auditor-General’s office”* (TL #547).

Case E – Wholly Australian Owned Private Company, Charitable Organisation

Case E did not have a specific framework for performance monitoring and relied on the key performance indicators defined by ITIL. The organisation had been implementing ITIL version 3 for three years. The first three processes were implemented in the following sequence: incident management, change management, and service catalogue management. The organisation also used PRINCE2, Six Sigma and the BSC. Some of the benefits from the ITSM implementation included: clearer understanding by the business of the services offered by IT and the level of service IT provides, reduced service incidents arising from implementing change, and clearer processes for handling and prioritising service incidents and recovering hidden issues. Sample ITSM performance metrics included: number of incidents or problems or requests raised and resolved, incidents arising from changes, and service level compliance. Service catalogue management and incident management were measured daily and reported monthly at the operational level. Change management was measured weekly and reported quarterly. A key metric and reporting challenge was *“configuring and reporting from our ITSM tool”* (SR ID #112).

Key internal environment factors influencing the selection of ITSM performance metrics were internal customers: “it’s been up to each division or department to determine how it would report back on that objective” (TL #308) and ITSM tools: “*But, yeah, the bulk of it comes from the problem management tool or the service management tool*” (TL #89). External environment factors that had some influence on the selection of ITSM performance metrics were industry: “*we’ve had a lot of people come into the group who’ve got ITIL experience in other organisations*” (TL #166).

Case F – Health and Community Services Provider

This organisation was in the early stages of implementing ITSM and is primarily adopting ITIL version 3. The duration of the implementation was one year. Incident management, request fulfillment, change management, and problem management processes had been implemented in that sequence. The organisation was also implementing PMBOK. Sample benefits included providing customers visibility of what was being offered, availability reporting to management for core applications, reporting to management around adherence to agreed resolution times, visibility to the organisation (including IT) around changes being made in the production environments allowing for better scheduling, standardisation of workflows for requests, tracking and recording of all incidents and more in-depth investigation of issues as opposed to focus on “break then fix”. Sample metrics included: mean time between failures, overall availability, adherence to target resolution timeframes, number of service requests by service, by location, by user; and number of incidents by service, by priority, and by location. Incident management was measured monthly and reported ad hoc at the operational level, while request fulfillment, problem management, availability management and service level management were measured and reported monthly. A key measurement challenge was “*knowing what to measure*” (SR ID #204) and a key reporting challenge was “*knowing who or what or how to report*” (SR ID #204).

The key internal environment factors influencing the selection of ITSM performance metrics in Case F were as follows:

- the ITSM manager’s perspective: “*It’s based on me ... I did a bit of research on Google and things like that*” (TL #1249);
- ITSM tools: “*So we have an ITSM tool that we’re using and most of our data comes straight out of that*” (TL #58);
- and IS goals: “*the motivation is to do with providing higher quality services and cost cutting*” (TL #157).

The industry sector was the main external influencing factor.

Cross Case Analysis Findings

As summarised in Table 4, all six case study organisations identified the following internal environment factors as influencing the selection of performance metrics: corporate strategy and goals, governance framework, IS function structure, and ITSM and ICT tools. Five of the cases reported the influence of organisation culture, senior management philosophy, and the ITSM manager’s perspective. Important external environment factors in five of the cases were legislation and industry sector. The two managed service providers were influenced by external customers as an external environment factor, while three of the internal IT service units were influenced by internal customers as an internal environment factor. In Case F the internal customers may not have been an influencing factor as their implementation of ITSM was in its second year: in this case the ITSM manager perspective was an influencing factor.

The analysis revealed variation in the range of influencing factors. In Case E, 16 influencing internal environment factors were identified, while Case D reported six external environment factors.

Table 4 Environmental factors influencing selection of ITSM performance metrics						
	Case Study Organisation					
INTERNAL ENVIRONMENT FACTORS	A	B	C	D	E	F
Corporate strategy and goals	✓	✓	✓	✓	✓	✓
Organisation size			✓		✓	
Organisation culture (historical metrics)	✓	✓		✓	✓	✓
Governance framework	✓	✓	✓	✓	✓	✓
Corporate performance measurement framework e.g. BSC	✓		✓	✓		
HR performance monitoring	✓					
Top management support for performance metrics						✓
Senior management philosophy	✓		✓	✓	✓	✓
Senior management needs	✓	✓	✓			
CIO influence		✓		✓	✓	
IS goals: visibility, chargeback, standardisation, improvement		✓			✓	✓
IS function size (e.g. headcount and budget)	✓	✓	✓		✓	
IS function structure: centralised, decentralised or matrix	✓	✓	✓	✓	✓	✓
IS function maturity				✓	✓	✓
ITSM manager perspective	✓	✓		✓	✓	✓
ITSM and ICT tools	✓	✓	✓	✓	✓	✓
ITSM staff management					✓	✓
IT operations staff influence	✓			✓	✓	
ITIL process implementation					✓	
Internal customers		✓	✓	✓	✓	
Knowledge management						✓
Ease of use/measurement				✓		
EXTERNAL ENVIRONMENT FACTORS						
Industry sector	✓		✓	✓	✓	✓
Competitive environment				✓		✓
Culture – external to the organization				✓		
Climate (including natural and manmade disasters)						
Legislation	✓	✓		✓	✓	✓
External customers	✓		✓	✓		
ITSM resources (e.g. ITIL books, training, standards, consultants)			✓	✓	✓	✓

Discussion

Interpretation of the results

The case study findings suggest that selection of ITSM performance metrics is influenced by a range of internal and external environment factors. Although it could be expected that larger organizations would have more resources for performance measurement, organisation size was not reported as a strong influencing factor among the organisations studied.

It is also observed that the sequence of ITIL processes implemented did not influence the selection of metrics. ITSM maturity, in terms of the years of ITSM implementation, was expected to have a strong influence on the selection of ITSM performance metrics. ITSM practitioners tend to favour describing ITSM performance in terms of organisation maturity frameworks (England 2011). Process capability levels, such as those detailed in the CMMI, associate metrics use with advanced stages of process improvement. However this was only evident in Case C, and was lacking even for organisations which reviewed the effectiveness of their metrics.

Despite the accepted wisdom that senior management support is essential for implementing projects involving process change, top management support for performance metrics was not identified as an influencing factor in five of the six case study organisations.

A contingency theory of the performance measurement of ITSM

Based on the results of the cross case analysis, we propose a contingency theory of ITSM performance measurement that provides guidance on the selection of ITSM metrics “that neither dictates a universal solution that is unrealistic for most organisations nor advocates a situation specific view that provides no assistance beyond a specific context” (Myers et al. 1997). Our analysis indicates that there are particular environmental factors, internal and external, common to the case study organisations that influence the selection of ITSM performance metrics. Also, the selection of ITSM metrics is influenced by a variety of internal and external environment factors for each of the case study organisations.

We summarise the findings in an ITSM performance metrics selection model shown in Figure 2. This model adapts Myers et al.’s IS assessment selection model (1997) to ITSM performance.

In the model, the ITSM performance dimensions of function, process and technology were derived from the practitioner literature (Brooks 2006; Steinberg 2006) and confirmed in the case study interviews. A fourth dimension, service, emerged to represent a higher level category of metrics considered important to the business: *“from a metrics point of view it is a process-by-process thing not a contribution-to-outcome thing. It’s like all of these individual things on their own are interesting but it’s their contribution overall to the outcome that really is the key for me and we’re not there yet”* (Case A, TL #320), *“No, [it’s not about the client organisation size] because it’s dependent upon the service and people value add ... Yeah, so the service has a set of metrics that goes with it.”* (Case C, TL #390 to 402). The service dimension includes metrics to account for end-to-end process outcomes. For each dimension, a sample set of metrics derived from the literature and case studies is included in Figure 2.

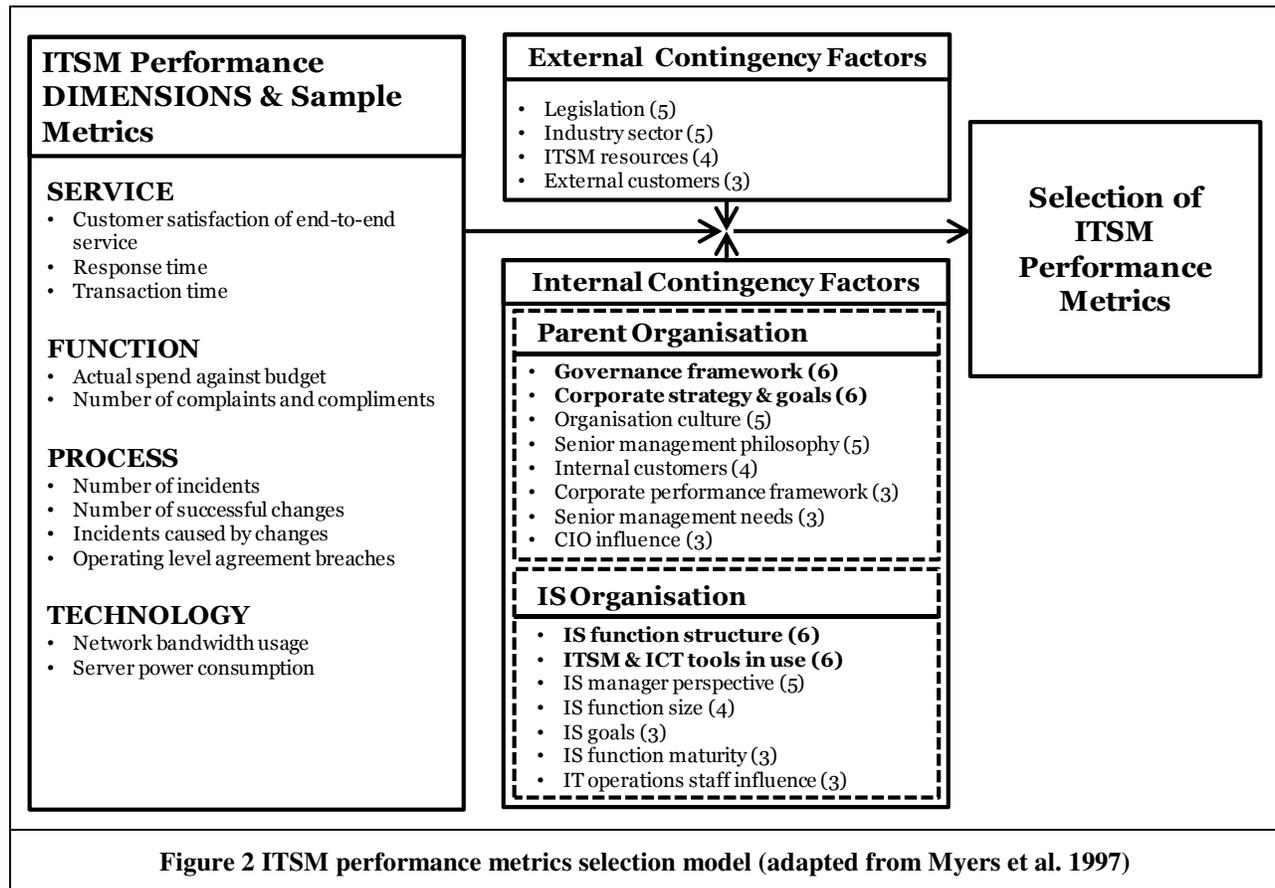
The environment contingency factors shown in Figure 2 are based on the IS function studies performed by Saunders and Jones (1992) and Myers et al. (1997). Based on the emergent factors from the content analysis, we extend the IS function model by separating the internal factors into two categories: parent organisation and the IS organisation. The factors shown in boldface are common to all six cases. The number in parentheses indicates the incidence of each factor across the six cases.

There were similarities between the selected internal contingency factors influencing the selection of metrics identified in the IS function study by Myers et al. (1997) and our ITSM study. In addition to all those listed in the previous IS function study we identified new internal contingency factors such as ITSM and ICT tools and corporate performance measurement framework in use, such as the BSC.

The external environment contingency factors which emerged in our study were different from those reported in the IS function study: industry sector and ITSM resources were the only factors identified in both studies. Occurrence of adverse events, such as natural disasters and the global financial crisis, was a factor in the Myers et al. (1997) list that was not influential in any of the case study organisations. Furthermore our list identified new contingency factors such as legislation, external customer, and ITSM resources such as, books, training and standards.

There were no differences observed in the selection of metrics when comparisons were made between public/private sector, small/large organisations, or the duration of the ITSM initiative. However, it was apparent during the interviews that organisations actively using a corporate performance measurement framework (e.g. Cases A, C and D) had implemented a more clearly defined set of metrics compared to the other three organisations. In Case B and Case E, it appeared that the metrics were dependent on the IS function structure as demonstrated by the personal interest and efforts of the CIO and ITSM manager.

In the pursuit of implementing ITSM best practices, organisations are faced with contingencies which influence the eventual selection of ITSM performance metrics. ITSM practitioners have numerous ITSM metrics at their disposal available from the ITIL continual service improvement (OGC 2007a) and service transition (OGC 2007b) publications, ITIL metrics books (Brooks 2006; Steinberg 2006), ITSM practitioner forums (itSMF International 2008), numerous vendor and consultant websites (EAB. group pty. ltd. 2009), blogs (England 2011), and social networking sites (Van Bon 2011). In the proposed model we categorise the available metrics along performance measurement dimensions of service, function, process and technology. From the case studies we find the selection of the metrics is influenced by various external and internal environment factors. These internal environment factors include those of the parent organisation and IS organisation. Four factors common to all six organisations, as shown in bold case in Figure 2, were identified: governance framework, corporate strategy and goals, IS function structure, and ITSM and ICT tools in use.



In our model in Figure 2 we have included various external and internal contingency factors that appear in at least three of the case study organisations (as listed in Table 4). The external environment contingency factors identified are legislation, industry sector, ITSM resources (books, training, standards, consultants) and external customers. Legislation includes legal and regulatory requirements that organisations comply with such as reporting customer complaints. Industry sector factors include benchmarking against the metrics used by other organisations in the same industry. External customers are customers of managed IT services such as the customer organisations that procure IT services from the managed service providers.

The internal environment contingency factors identified are divided into two categories: parent organisation and IS organisation. The parent organisation factors include governance framework, corporate strategy and goals, organisation culture (shared values and norms), senior management philosophy (principles guiding the management style), internal customers, corporate performance

measurement framework, senior management needs (senior managers task fulfillment requirements) and CIO influence (CIO affecting decisions and behavior).

The IS organisation category includes the IS function structure, ITSM and ICT tools in use, IS manager's perspective, IS function size, goals and maturity, and the influence of IT operations staff. IS structure refers to the organisation structure of the IS function such as matrix, centralised or federated. The ICT tools include ITSM software, the telephone software and network monitoring software. IS function size includes headcount of IS department as well as budget value. IT operations staff influence was evidenced by reporting requirements for metrics around incident resolution and change management.

The contingency factors shown in the model (Figure 2) highlight the influence of individual preferences in the selection of metrics. The following factors are related to personnel: CIO influence, senior management needs, senior management philosophy, IS manager perspective and IT operations staff. In three cases (B, D and E), a change in personnel directly resulted in use or abandonment of performance measurement frameworks and ITSM metrics.

Conclusion

This research on factors influencing selection of performance metrics for ITSM fits into a wider research study to explore current practice and design a performance measurement framework for ITSM. The research reported here sought to address a specific question that considered the influence of two categories of environment factors: internal and external. To answer the research question posed, the case studies indicate that three categories of factors influence organisations' selection of ITSM performance metrics: external environment factors, parent organisation factors and IS organisation factors. The selected metrics are contingent on a discrete set of factors.

Four factors common to all six organisations were identified as influencing the selection of ITSM performance metrics: governance framework, corporate strategy and goals, IS function structure, and ITSM and ICT tools in use. However, the influence of contingent factors such as legislation, industry sector, organisation culture, senior management philosophy, and the IS manager's perspective were evident in five of the cases. External customers influenced the two managed service providers, while four of the IT service units were influenced by internal customers. When comparisons were made between public/private sector, small/large organisations, or the duration of the ITSM initiative, no differences were observed in the selection of metrics. However, it was apparent that the use of a corporate performance measurement framework was associated with a more clearly articulated set of metrics.

The main contribution of this study is to alert ITSM practitioners to the importance of fully understanding the influence of the external environment, the parent organisation and the IS organisation on the selection of ITSM metrics. Although it is tempting for practitioners to adopt generic ITSM metrics unilaterally from the ITIL books or ITIL software, it is more effective to tailor the measures in response to their individual internal and external environments.

Implications of the study

The ITSM performance metrics selection model developed in this study was adapted from that used by Myers et al. and Saunders and Jones. The model presented here represents an extension of their models by splitting internal factors into two categories: parent organisation and IS organisation. In extending the contingency theory to the area of ITSM this study makes a contribution to the reference discipline of organisational studies. Furthermore, this study contributes to the emerging service science cross-disciplinary field. It addresses the basic underlying elements of IT service systems: value, stakeholder perspectives, and measures.

The implications for practitioners are that the study provides a comprehensive set of ITSM performance dimensions and sample metrics that may help ITSM managers develop their own ITSM performance measurement frameworks.

The case study organisations with dedicated corporate performance measurement frameworks have clear ITSM performance metrics that are reported to the organisation. Such organisations have achieved effective integration of IS functions within the organisation. The factors identified as influencing the

selection of ITSM performance metrics point to the strategic importance of ITSM performance measurement beyond meeting legal requirements.

Limitations and future work

A recognised limitation of the qualitative case study approach is the ability to generalise the findings. For this research, efforts were made to select cases to provide a broad representative sample in terms of industry sector, size, and geographic location. We propose future research work of a more quantitative nature involving surveys and/or longitudinal studies so as to broaden the applicability and representativeness of this research. Future work may extend the study to capture the extent of influence of the identified factors.

The third stage of the project uses design science to develop an ITSM performance measurement framework. ITSM practitioners focussed on providing highly valuable services to their organisations are evolving towards improved customer orientation by seeking guidance about how to measure performance of their IT services: *“I do not think there’s any well-defined model at a logical sense, even though cognitively people would think that there is”* (Case B, TL #241). This research is an important step towards closing this academic/practitioner gap in ITSM performance measurement.

Notes: ITIL® and PRINCE2® – are registered trademarks of the UK, Office of Government Commerce; CobiT® – is a registered trademark of the Information Systems Audit and Control Association (ISACA); CMMI® is a registered trademark of the Software Engineering Institute at Carnegie Mellon University.

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Appendix A Case Study Interview Questions

Table A 1 Interview Questions

ITSM Performance Measurement Framework

- A.1 From the survey I realise you are primarily using ITIL as your ITSM framework. What framework(s) are you currently using to measure the performance of your IT service management?
- A.2 Do you know if other frameworks were considered when your organisation selected the framework(s) for measuring the performance of your ITSM?
- A.3 When did you implement the framework(s) used to measure the performance of your ITSM?
- A.4 Were there factors internal to the organisation that influenced the decision to implement the framework used to measure the performance of your ITSM?
- A.5 Were there factors external to the organisation that influenced the decision to implement the framework used to measure the performance of your ITSM?
- A.6 What are the objectives of measuring the performance of your ITSM?
- A.7 Is the framework used to measure the performance of your ITSM only or is it part of the entire organisations performance measurement?
- A.8 At what levels of the organisation (top, middle and operational) is the performance of your ITSM measured?
- A.9 What are the roles of those involved in measuring and reporting the performance of your ITSM?
- A.10 How do you align the measurement of the performance of your ITSM to the overall organisations strategy?
- A.11 We know that the overall ITSM provides your organisation benefits. What has your organisation gained from measuring the performance of your ITSM?
- A.12 Is it possible for you to provide documentation of the ITSM performance measurement framework used?

ITSM Performance Metrics

- B.1 In terms of the measurement of the performance of the implemented ITSM do you use ITSM tools, spreadsheets, surveys or do it manually?
- B.2 Can you give me examples of metrics that you use related to ITSM?
- B.3 Does your IT organisation (division, department, unit, team) maintain a catalogue/dictionary of current ITSM performance metrics? Please provide me with the metrics catalogue (definitions and attributes).

- B.4 What factors (industry, size, ownership, legislation, competitors, customers, historical) influenced the selection of the metrics used to measure the performance of ITSM?
- B.5 How are the metrics organised (for example areas of focus such as people, process, partners and technology) within the ITSM performance measurement framework? Why are the metrics organised in this way?
- B.6 Are the metrics classified into categories for example lead versus lag, qualitative versus quantitative, internal versus external, financial versus nonfinancial? Why do you use this specific categorisation? Sample documents?
- B.7 Who is involved in collecting metrics and at what levels of the organisations are they positioned?
- B.8 Do you review the effectiveness of the ITSM performance metrics collected?
- B.9 Do you think that some of the metrics are more effective than others? Why?
- B.10 How do you ensure the ITSM performance metrics are accurate (validity and reliability)?

ITSM Performance Reporting

- C.1 How do you use the information collected from the measurement of the performance of your ITSM (for monitoring, planning, improvements, decision-making)?
- C.2 How is reporting of the measurement of the performance of your ITSM done (verbally, dashboards, webpage)?
- C.3 To what levels (top, middle and operational) is the measurement of the performance of your ITSM reported?
- C.4 What is the rationale for having the measurement of the performance of your ITSM reported at these levels?
- C.5 What is the frequency of reporting of the measurement of the performance of your ITSM?
For example daily, weekly, monthly, quarterly, ad hoc and the reason for the time frame. Why this frequency?
- C.6 What are the outcomes (decisions, actions, behaviour change) from the reporting of the measurement of the performance of your ITSM?
- C.7 How do you determine what reports, from measurement of the performance of your ITSM, are relevant to the report users (management / the business)?
- C.8 Please provide sample reports (dashboards, spreadsheets) of measurement of the performance of your ITSM.
- C.9 You may provide any other information and documentation you would like to add.
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