

8-2010

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Recommended Citation

Flores, Johnny; Rusu, Lazar; and Johanneson, Paul, "Evaluating IT Service Delivery amongst ISPs from Nicaragua" (2010). *AMCIS 2010 Proceedings*. 47.

<http://aisel.aisnet.org/amcis2010/47>

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Evaluating IT Service Delivery amongst ISPs from Nicaragua

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ABSTRACT

This paper presents an evaluation of IT service delivery by Internet Service Providers (ISPs) from Nicaragua at the end of 2009. The evaluation is supported by a methodological approach based on IT Infrastructure Library (ITIL) v.2 concepts and case study techniques. The evaluation involved three ISPs that are nation-wide Internet Service Providers with more than ten years running. We describe the current practices and limitations of IT service delivery in ISPs from Nicaragua. Finally, we argue that existing IT service delivery practices amongst ISPs have matches to ITIL processes, although the ITIL processes are not known amongst them.

Keywords

ITIL, Service Delivery, Case Study, Internet Service Providers (ISPs).

INTRODUCTION

Nowadays, IT Service management is one of the challenges of organizations because of the demand for high quality service by customers. IT Service Providers are continually striving to improve the quality of the service, while at the same time trying to reduce the costs (ITIL, 2003d). IT service management has been one of the concerns of researchers and several approaches have been proposed around the world, such as categories of IT success (DeLone, et al., 1992); concepts of IT service quality (Bednar, 1994; Herson, et al., 2001); customer satisfaction with the service known as SERVQUAL (Parasuraman, et al., 1988; Parasuraman, et al., 1994); the conceptual model of strategic IT management referred to as Strategic Alignment Model (SAM) (Henderson, et al., 1993), which has been implemented (Luftman, et al., 1993) and derived into a strategic alignment maturity model (SAMM) (Luftman, 2003; Luftman, et al., 2003); and finally, Information Technology Infrastructure Management (ITIL). The latter has become the undisputed global *de facto* framework for IT service management, as corroborated by the rapid increase in membership of the IT Service Management Forum, which is an interest group enhancing and propagating the ITIL principles (Lawes, 2003). Also the large number of practice-oriented ITIL conferences, publications and training opportunities (Doughty, 2003; Foundation, 2004; Hendriks, et al., 2002; Keisch, et al., 2002) indicate the growing relevance of ITIL. ITIL v.2 provides the following set of seven interrelated IT service delivery processes from the best public and private sector practices (ITIL, 2003d): service catalogue, financial management, service level management, capacity management, IT service continuous management, availability management and security management. ITIL v.2 was selected because it is oriented to the implementation of IT service management and ITIL v.3 has a more conceptual perspective.

This study addresses the research question: What is the current state of IT Service Delivery amongst ISPs from Nicaragua? We chose to analyze IT service delivery in Internet Service Providers (ISPs) from Nicaragua for two reasons. First, we have not found the current situation of IT service delivery in ISPs from developing countries in the literature. Second, this allows us to determine the current situation of IT service delivery amongst ISPs as empirical knowledge, and the findings, such as practices, limitations and problems, could help these organizations make informed decisions about IT service delivery in order to allocate resources in an efficient and effective way.

The paper is organized in four sections: research background, introducing ITIL concepts; research method, presenting the method for analyzing IT service delivery; analysis and results, describing the current situation amongst ISPs from Nicaragua; and finally discussion and conclusions.

RESEARCH BACKGROUND

Developed in the late 1980s, the IT Infrastructure Library (ITIL) has become the world-wide *de facto* standard in Service Management. Being a framework, ITIL describes the contours of organizing Service Management. The models show the goals, general activities, inputs and outputs of the various processes that can be incorporated within IT organizations. (ITIL, 2003d)

IT service providers are continually striving to improve the quality of the service, while at the same time trying to reduce the costs or, at a minimum, maintain them at the current level. ITIL processes are interdependent and underpinned by integrative management (Bartlett, et al., 2001; Berkhout, et al., 2001). ITIL v2.0 is made up of: (a) *Service Delivery* (SD), which involves Service Catalogue Management, Service Level Management, Financial Management, Capacity Management, and IT service Continuity Management (ITIL, 2003d); (b) *Service Support* (SS) (ITIL, 2002b); (c) *Application Management* (ITIL, 2002a); (d) *Software Asset Management* (SAM) (ITIL, 2003e); (e) *Security Management* (ITIL, 2003c); (f) *Infrastructure Management* (ITIL, 2003a); and (g) *IT Planning to Implement Service Management* (ITIL, 2003b).

RESEARCH METHOD

In the study, we adopted a method for analyzing IT service delivery that is founded in the interpretive approach; it allows us to construct the world by its participants based on subjective meanings of their experiences within certain objects (Mannheim, 1997). As qualitative research, its design is focused on understanding the social and cultural contexts within which people live (Myers, 2009). The adopted method is available at (<http://www.itservice.uni.edu.ni/JFlores/method.html>); it combines ITIL v.2 Service Delivery and Security management and case study technique (Yin, 1994). The method includes a set of questionnaires and a procedure for collecting and validating information. The questionnaires are structured based on the activities, guidelines, Performance Indicator (PI)/Metrics, Methods/Tools and components suggested by Service Delivery and Security Management and a summary is presented in table 1. For sample, Service Catalogue has 4 main activities and 5

PI/Metrics and corresponds to 3% of all the elements. The procedure for collecting and validating information is based on case study techniques. Each questionnaire contains a brief description of the process, characteristics of the persons who could have the information related to the questionnaire, the time required and evidence for supporting the participants' claims. Questionnaires are available at (<http://www.itservice.uni.edu.ni/JFlores/introduction.htm>).

| ITIL-processes | Activities | Guidelines | PI/ Metrics | Methods/ tools | Components | Number of elements by ITIL process | Percentage based on all of the elements |
|----------------------------------|------------|------------|-------------|----------------|------------|------------------------------------|---|
| Service Catalogue | 4 | N/A | 5 | N/A | N/A | 9 | 3% |
| Service Level Management | 10 | N/A | 38 | N/A | 14 | 62 | 20% |
| Financial Management | N/A | 18 | 13 | 26 | 19 | 76 | 24% |
| Capacity Management | 4 | N/A | 24 | N/A | N/A | 28 | 9 % |
| IT Service Continuity Management | 10 | N/A | 8 | N/A | 4 | 22 | 7% |
| Availability Management | 8 | N/A | 24 | 9 | 6 | 47 | 15% |
| Security Management | 6 | 40 | 19 | N/A | 3 | 68 | 22% |
| Total | 44 | 58 | 131 | 35 | 46 | 312 | |

Table 1. Summary of the Activities, Guidelines, PI/Metrics, Methods/Tools and Components of IT Service Delivery and Security Management

Note. PI: Performance Indicators, N/A: Non-applicable, which means "Not defined by ITIL"

As part of the method adopted, a non-disclosure agreement should be signed in order to specify that the information collected is used for academic purposes and multiple sources of evidence should be defined such as semi-structured interview, focus group and documents. Semi structured-interviews are interviews with predetermined questions that can be modified based on the interviewer's perception of what seems most appropriate (Robson, 2002). The focus group is a collection of respondents organized in a group discussion format to present their ideas about a subject (Nardi, 2003) and documents in real-world settings. The purpose of the semi-structured interview, focus group and documents is to provide information about the current state of the IT service delivery. The information collected is validated through a chain of evidence that makes explicit links among the questions asked, the data collected and the conclusions drawn (Yin, 1994). Semi-structured interviews and focus groups should be recorded in order to identify factual information that includes what respondents know about the subject under investigation, and what respondents did in the past, are doing now and intend to do in the future (Kerlinger, et al., 1992) for building a traceable case study database. The duration of each semi-structured interview/focus group is approximately 1 hour. The interviewer should act as a neutral medium through which questions and answers are transmitted, thus endeavouring to eliminate bias. Furthermore, the interviewers should avoid giving overt signals such as smiling and nodding approvingly at a respondent's answer to a question (Love, et al., 2006). The multiple sources of information and the chain of evidence allow correct operational measures to be established and validity constructed for the concepts being studied (Yin, 1994) and the study can be replicated to any organization, making the adopted method reliable (Yin, 1994).

For calculating the percentage of match between IT service delivery practices at the organization studied and ITIL process: (Percentage of match) = (elements found of IT service delivery in the organization) * (100) / (total elements of the ITIL-process).

ANALYSIS AND RESULTS

In order to respond to the research question, three Internet Service Providers (ISPs) participated in the study at the end of 2009. They represent 60% of the five ISPs that are nation-wide Internet Service Providers with more than ten years running. These ISPs are members of the Nicaraguan Internet Association (AIN - www.ain.org.ni), which is a non-profit organization that groups the main ISPs, educational nodes and other entities in Nicaragua. AIN is composed of eleven ISPs, four universities and three entities. ISPs offer high-speed Internet connectivity services over fibre optical and wireless. The participant ISPs will hereafter be referred to as organization A, B and C, respectively. These organizations are competitors and a non-disclosure agreement was required in order to protect their integrity, define the purpose of the study and their **benefits**. The analysis was conducted as follows:

Several meetings were required in order to clarify any doubt about the study. The organizations were motivated by the opportunity of getting academic information about ITIL-IT service delivery that could help them increase the quality of the IT. Organization A was the most proactive and provided a lot of feedback about the questionnaire and the way the semi-structured interviews and focus groups were conducted. A non-disclosure agreement was submitted to each steering committee of each ISP for adjustments and then it was signed and the study started. Although several semi-structured interviews and focus groups were scheduled, not all of them were executed. The information collected comes from a key person at the ISPs. The diversity of organizational structures and behaviour of these organizations can help us characterize the environmental context of the current status of IT service delivery amongst ISPs.

Organization A has a flat organizational structure that encourages communication through the whole organization and is more dynamic than formal. The majority of its clients are corporate organizations that represent 80% of the profit, but it also covers medium and small companies. The information collected comes from five interviews and two focus groups and the participants were the Chief Executive Officer (CEO), Systems Manager, Telecommunication Manager and Sales Manager.

Organization B has a vertical organizational structure with a clear definition of the role and functions of its personnel. The clients are grouped by household and corporate customers in a proportion of 40% and 60%, respectively. The information collected comes from seven interviews, and one focus group and the participants were the Chief Financial Officer (CFO), Customer Service and Support Coordinator, IT coordinator, Call Centre Coordinator, Sales Manager, Technical Manager and Operation Manager.

Organization C has a formal organizational structure and is part of the regional organization in Central America. The company has incorporated Sarbanes-Oxley Act (SOX, 2002) as the control system and its clients are approximately 500 corporate customers. The information collected comes from seven interviews and one focus group and the participants were the Chief Executive Officer (CEO), Operation Manager, Network Operational Centre (NOC) Manager, Telecommunication Coordinator, Customer Service Coordinator and Sales Manager.

A brief description of practices and limitations of the ITIL process of IT service delivery amongst the participant organizations follows:

Service Catalogue

Organizations A, B and C have sales and technical staffs that work together for defining new/upgrade services. The sales staff is responsible for collecting requirements or offering service to customers. Through sight surveys, the IT staff analyzes the feasibility of the IT service. All of them have a customer database system, but only organization C has a regional customer system and a configuration system that is a set of tools and databases that includes information about incidents, problems, known errors, changes and release. Key Performance indicators are implemented as Goal Indicators such as discrepancy between the service registered and the real situation, number of services registered and managed.

Service Level Management

Organizations A, B and C use the Service Level Agreement (SLA) as the terms of compliance with customers. Any SLA is negotiated and agreed to between the customer and IT provider based on service level requirements; SLA contains service description, service hours, service availability, customer support, service performance and details of any specific responsibilities on both sides. Organization C produces regular reports on service performance and achievements to the customer. The three organizations lack a formal procedure for following customer perceptions of the services and mapping for demands.

Financial Management

Organizations A, B and C are aware of the importance of financial issues to be successful in a competitive market. Billing systems have been implemented to guarantee the accuracy of the customer's bill. The main key performance indicators are return on investment, portfolio recovery, capital cost and operational cost. IT accounting is focused on accounting centre, recovery centre and profit centre. The pricing methods established are marginal cost, market price and fixed price. Budgeting is a common practice for Organizations B and C. Organization C has the most structured and well-established mechanism for financial control, which is known as SOX (SOX, 2002).

Capacity Management

Organizations A, B C have implemented tools for monitoring the service performances, such us Solarwinds ORION software, What's up and Kat-tty. There is no measuring of future business requirements that promote the forecasting of business trends based on experience of their steering committees. The forecast workload is based on empirical experiences. There is a lack of planning capacity.

IT Service Continuity (ITSC) Management

Organizations A, B and C have exceptional empirical knowledge from dealing with incidents and IT service problems reported by customers or monitored by the system and the way to respond to interruption of IT services, although continuous IT service management is not a common practice. Contingency processes/procedures are formally structured, but not documented. Organization C is implementing business continuity process plan and then constructs an IT service continuity plan because it is a requirement of SOX as the internal control system. Risk analysis methods are not used by these organizations.

Availability Management

Organizations A, B and C use the tools for monitoring IT capacity to monitor service availability and consumption of bandwidth, packet loss and local trunk (nodes). A trouble-shooting system (in-house) is implemented to respond in real time to any customer request, but there is a lack of available plans and metrics for maintaining IT services.

Security Management

Organizations A, B and C have security policies that come from guidelines for critical situations and are founded on common understanding and commitment by their personnel. Organization C is placed on top of security control system, which is based on SOX (SOX, 2002). Roles and responsibilities of the personnel are defined in the contract as security organization measures. The organizations have physically separated the computer room as a physical security measure, and there is an access control to computer systems and network systems as technical security measures, but there is no formalized Key Performance Indicator for security processes.

ITIL processes are not known by these organizations. However, there are some matches between their practices and ITIL processes. The following are common matches to ITIL processes:

- Service definition in service catalogue management,
- Negotiation, agreement and maintenance of SLA with customers in service level management
- Analysis of the customers' requirement with IT staff in service level management
- Initiation of any actions required to maintain or improve service levels in service level management
- Structuring of service contracts as ITIL defines SLA in service level management
- Discrepancies in charges are identified quickly and resolved with the customers in financial management
- All hardware, software, people, accommodation and transfer costs are accounted for in financial management
- Resource is allocated to any activity in financial management
- Return on Investment is an IT investment indicator in financial management
- IT accounting is focused on recovery and profit centre in financial management
- Type of cost defined for hardware, software, people, accommodation, external service in financial management
- Price methods such as market price and fixed price in financial management
- The utilization of all components and services is recorded in capacity management
- Any new service implemented matches service requirement in capacity management

- Availability requirements for the business for a new or enhanced IT service are determined in availability management
- The underlying reason for unacceptable availability is investigated in availability management
- Technical observation post in availability management
- Definition of roles and responsibility to the personnel in security management
- Security organization measures, physical security measures, technical security measures and preventive security measures in security management

Organizations A, B and C match ITIL processes 27 percent, 37 percent and 55 percent, respectively; the most representative process is financial management, followed by security management, service catalogue and capacity management. Table 2 shows a summary of matches between “Organization A” and ITIL-processes where financial management is the most representative process, followed by Service Level management and Availability Management with 57%, 26% and 21%, respectively.

| ITIL-processes | Activities | Guidelines | PI/ Metrics | Methods/ tools | Components | Number of elements found | Percentage of Match by ITIL process |
|-------------------|------------|------------|----------------|-------------------|------------|--------------------------------|---|
| Service Catalogue | 1 | N/A | 0 | N/A | N/A | 1 | 11% |
| Service Level Mgt | 5 | N/A | 0 | N/A | 11 | 16 | 26% |
| Financial Mgt. | N/A | 5 | 3 | 16 | 19 | 43 | 57% |
| Capacity Mgt. | 0 | N/A | 4 | N/A | N/A | 4 | 14 % |
| IT SC Mgt. | 0 | N/A | 0 | N/A | 0 | 0 | 0% |
| Availability Mgt. | 2 | N/A | 1 | 3 | 0 | 6 | 13% |
| Security Mgt. | 0 | 7 | 11 | N/A | 3 | 21 | 21% |
| Total | 8 | 12 | 18 | 19 | 33 | 91 | |

Table 2. Matches between “Organization A” and ITIL-Processes.

Note. Mgt: Management, PI: Performance Indicators, N/A: Non-applicable, which means “Not defined by ITIL”

Table 3 shows a summary of matches between “Organization B” and ITIL-processes where financial management is the most representative process, followed by Security Management and Availability Management with 70%, 32% and 30%, respectively.

| ITIL-processes | Activities | Guidelines | PI/ Metrics | Methods/ tools | Components | Number of elements found | Percentage of Match by ITIL process |
|--------------------|------------|------------|----------------|-------------------|------------|--------------------------------|---|
| Service Catalogue | 1 | N/A | 0 | N/A | N/A | 1 | 11% |
| Service Level Mgt. | 4 | N/A | 0 | N/A | 11 | 15 | 24% |
| Financial Mgt. | N/A | 6 | 7 | 21 | 19 | 19 | 70% |
| Capacity Mgt. | 1 | N/A | 5 | N/A | N/A | 6 | 21 % |
| ITSC Mgt. | 0 | N/A | 0 | N/A | 4 | 4 | 18% |
| Availability Mgt. | 5 | N/A | 1 | 2 | 6 | 14 | 30% |
| Security Mgt. | 1 | 12 | 18 | N/A | 3 | 34 | 32% |
| Total | 12 | 18 | 31 | 23 | 43 | 127 | |

Table 3. Matches between “Organization B” and ITIL-Processes.

Note. Mgt: Management, PI: Performance Indicators, N/A: Non-applicable, which means “Not defined by ITIL”

Table 4 shows a summary of matches between “Organization C” and ITIL processes where service catalogue is the most representative process, followed by Financial Management and Security Management with 100%, 86% and 79%, respectively.

| ITIL-processes | Activities | Guidelines | PI/ Metrics | Methods/ tools | Components | Number of elements found | Percentage of Match by ITIL process |
|-------------------------------|------------|------------|----------------|-------------------|------------|--------------------------------|---|
| Service Catalogue | 4 | N/A | 5 | N/A | N/A | 9 | 100% |
| Service Level Mgt. | 4 | N/A | 0 | N/A | 10 | 14 | 24% |
| Financial Mgt. | N/A | 18 | 6 | 23 | 18 | 65 | 86% |
| Capacity Mgt. | 4 | N/A | 6 | N/A | N/A | 10 | 36 % |
| IT Service Continuity Mgt. | 0 | N/A | 0 | N/A | 4 | 4 | 18% |
| Availability Mgt. | 4 | N/A | 3 | 3 | 3 | 13 | 28% |
| Security Mgt. | 6 | 40 | 6 | N/A | 3 | 55 | 79% |
| Total | 22 | 58 | 26 | 26 | 38 | 170 | |

Table 3. Matches between “Organization C” and ITIL-Processes.

Note. Mgt: Management, PI: Performance Indicators, N/A: Non-applicable, which means “Not defined by ITIL”

DISCUSSION

The study is supported by semi-structured interviews and focus groups, which limit the study to what people claim, but they were key persons who provide the day-to-day IT service delivery behaviour, such as CEO, Telecommunication manager, sales manager and others. In these organizations, there are several tools for monitoring and supervising IT service, but there is no process or procedure for measuring customer’s perception or standards oriented to increase the quality of the IT service. Their typical priorities are operation, marketing and sales.

IT service delivery practices come from a dynamic and informal organizational structure, and well structured and formal procedures amongst ISP,s which helps us construct the environmental context of the current IT service delivery status. Although ITIL concepts are not known, their activities, guidelines, performance indicators and components are present amongst ISPs and their most representative ITIL processes are financial management, followed by security management, service catalogue and capacity management.

CONCLUSION

The study enables us to make an informed decision about IT service delivery. It can be replicated to the same or other organizations in order to construct a longitudinal study and measure the impact on this kind of organization. The longitudinal study would allow us to identify advantages and limitations in IT service delivery decision-making process for formulating efficient and effective IT strategy.

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