International Journal of Advanced Science and Technology
Vol.116 (2018), pp.151-166
http://dx.doi.org/10.14257/ijast.2018.116.14

Small and Medium-sized Enterprise: Prioritization of Internet Bandwidth Needs for Business Purposes

Adamu I. Abubakar[1*], Japhet Eke Lawrence[2], Zerni Melmusi[3], Haruna Chiroma[4], Bahagia Tarigan[5], Erfan Rohadi[6] and Mungad[7]

[1]*Department of Information Systems, International Islamic University Malaysia, Malaysia*
[2]*Japel Technologies Limited, Owerri, Nigeria*
[3]*Universitas Putra Indonesia YPTK, Padang, West Sumatera, Indonesia*
[4]*Department of Computer Science, Federal College of Education (Technical), Gombe, Nigeria*
[5]*Universitas Teknologi Yogyakarta, Indonesia*
[6]*Politeknik Negeri Malang, Indonesia*
[7]*Universitas Negeri Yogyakarta, Indonesia*
**adamu@iium.edu.my*

Abstract

The use of internet bandwidth has become very important to the increasing number of small and medium-sized enterprise (SME). Regrettably, many employees are prone to abuse their unlimited internet access at work for non-work related purposes. Policies and monitoring of employee internet bandwidth use increase a firm's productivity. Unfortunately, trust issues between a company and its employees significantly affect the latter's organizational commitment and turnover intentions. This research proposes a model which allows employees to use their organization's internet bandwidth at work for work as well as non-work purposes while at the same time effectively utilizing the internet bandwidth for work purposes. This paper presents a firm's effective bandwidth utilization conceptual model which has been developed and tested statistically, and it also compares the resulting findings with the leading empirical studies in this domain.

Keywords: *Internet bandwidth use; Utilization Policies; Monitoring*

1. Introduction

Size and limited resources constitute a major challenge among the numerous challenges faced by SMEs as compared to well-established large corporations [1-3]. Previous studies have shown that a firm's capabilities and willingness to enhance staff efficiency in managing resources are the critical ways of achieving a competitive advantage [4]. Crucial to this are the available resources and the training at the organizational level on the most effective utilization of these resources [5-7]. Survival in today's competitive business world is limited to a firm's flexibility in adapting to new technologies and the ability to respond to any failure quickly and efficiently [8-11]. Internet bandwidth as applied to business transactions refers to the data transfer rate measured in bit-rate [12]. Thus, effective internet bandwidth utilization in this research refers to the highest reliable transmission rate expected for a path to provide [13-14]. The cost or price of internet bandwidth is also measured by bit-rate and varies from region to region around the world [15]. Due to the concerns raised about possible price discrimination by internet service providers (ISPs) on the access and usage of the internet

Received (February 23, 2018), Review Result (May 23, 2018), Accepted (May 30, 2018)

ISSN: 2005-4238 IJAST

bandwidth and network neutrality meaning "charging and treating all data on the Internet the same" was established as the founding principle of internet cost [16].

SMEs require an effective management of internet bandwidth for optimum service demand. Lehr and McKnight [17] observed that "rapid growth in traffic and the proliferation of new services fuelled by the internet has increased dynamic market demand uncertainty. When growth is exponential, even a small change in forecasted growth rates can have a dramatic impact on the projected market size". Therefore, the SMEs' flexible use of internet bandwidth and its effectiveness in utilizing the same are very essential for its survival, viewed from the technical as well as the user policy perspective [18]. Unfortunately, most of the approaches used by the SME management of internet bandwidth center on the use of software tools as well as policies on the use of the software, with little regard to the implications of user policy perspectives [19].

In terms of bandwidth utilization from the user perspective, it can be understood as the users' understanding and implementation of the firm's policies on critical events and devices with minimum effort on the use of internet bandwidth [20].

The presumption here is that every firm -- in one way or the other -- has decided on its own policy on internet bandwidth use, which provides its employees with rules and guidelines on the appropriate ways of increasing efficiency and guaranteeing fast resource access, detailed steps on maximizing the efficient use of bandwidth for business critical tasks and using the appropriate tools for network troubleshooting and security issues in the network. Therefore, this study aims at following in the footsteps of an enhanced networked management method which involved individual businesses representing SMEs units of analysis.

2. Development of Conceptual Model

Naturally, business rivalries exist among firms or company groups which translate into fierce competition. One of the most important tools to acquire a competitive advantage lies in the firm's resources [8] Thus a resource-based view becomes influenced by theoretical analysis as part of the overall approach in learning to use the firm's tangibles and intangible resources which enable it to achieve and sustain a competitive advantage over its rivals [16]. Despite several criticisms, the RBV gained massive influence in the management and organization literature due to its focus on firm level determinants of company performance which is widely regarded as a key advantage [21].

The most important aspect of statistical research design involves the generation and conceptualization of the research constructs, a process which includes proposing a construct and refining it by giving it a conceptual or theoretical definition [22]. The generated research constructs are conceptual terms which can be further analysed statistically to yield a phenomenon of theoretical interest or verbal surrogates for the phenomenon of interest [23]. This study proposes to use five main research constructs in order to formulate a hypothesis related to a firm's effective utilization of bandwidth. The constructs are presumed to contribute to the firm's achievement by effective utilization of bandwidth, which in turn may influence its staff efficiency. Although effective bandwidth utilization may or may not directly affect the firm's 'performance, an integrative model of internet bandwidth needs and internet bandwidth priority is due to reflect the firm's performance if its staff training and problem resolution are kept intact. This research relies on prior literature to serve as supporting facts for building a conceptual framework that is tested statistically. The research conceptual model is presented in Figure 1.

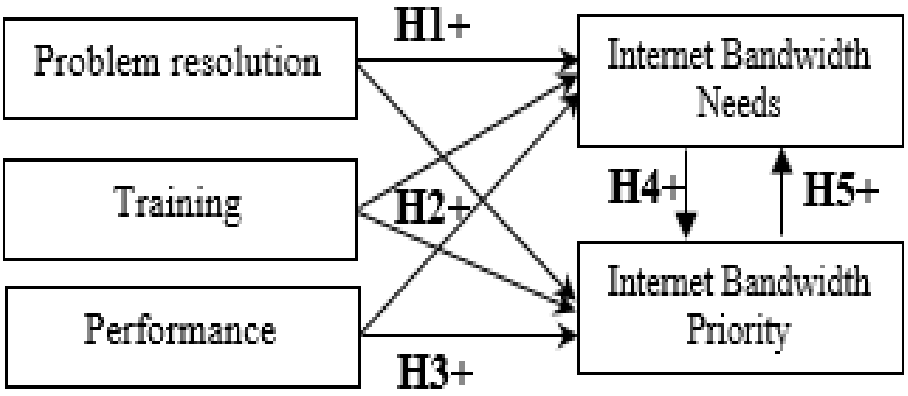

Figure 1. The Conceptual Model of Research

2.1. Problem Resolution Theory

Understanding internet bandwidth problems may prove difficult to end-users as not everything that looks like a bandwidth problem is indeed a bandwidth problem. For example, poor network configuration constitutes the cause of many internet bandwidth problems. Some firms may believe that the more internet bandwidth is used the better in order to avoid poor service, yet in some cases such an approach may not be the best or most efficient way of addressing poor services. However, any internet bandwidth problem results in poor performance for all applications that depend on it.

For many decades, problem solving theory has been linked to theories of learning, perception, and concept formation [24]. Hence problem solving has been attributed to the behavioural process of responding to a problematic situation with a high chance of selecting the most effective response from among alternatives [25]. The onward advances of technology always come with some sort of unexpected bottleneck that needs to be solved. Currently, cloud computing and virtualization adoption by many small to large firms are rampant. Firms need to be online at all times in order to meet today's business challenges that require the use of the internet. Connection failure for the duration of a few minutes means being cut off from online services and lead to a huge financial loss. Thus, firms need to be flexible in addressing internet bandwidth issues which need to be at the forefront of a firm's IT department as well as its entire staff involved in delivering such services.

Large amounts of data transferred on low internet bandwidth traffic can lead to poor network performance. It cannot be generalized that a low internet bandwidth problem alone causes bad performance. In terms of internet bandwidth, the solution could be to increase the bandwidth whenever a network monitoring tool reports the need for that. However, in most cases user tasks constitute the major part of the cause of internet bandwidth problems, specifically when many requests are made simultaneously. Thus, users need to analyze the impact and likelihood of problems that might arise and the cause of the problem. Furthermore, this issue of problem-solving may be attributable to personal information overload by measuring the ability of user decisions to solve problems when confronted with large amounts of information based on technological and behavioral solutions [26]. This research aims at further developing the aforementioned studies. In this respect, the following hypotheses are formulated:

H1a: The internet bandwidth problem-solving of firms will have a positive and direct impact on its internet bandwidth needs

H1b: The internet bandwidth problem-solving of firms will have a positive and direct impact on its Internet bandwidth priority.

2.2. Training

Firms have the responsibility to ensure that their employees are trained to achieve their objectives [27]. Each employee has to understand the methods of boosting a company's productivity as well as preventing and protecting their work environment [28]. Learning in an organization is mostly acquired through training in the form of adding knowledge, understanding or assimilating skills that become embedded in the organization's shared mental models and have the potential to influence behaviour in ways that can lead to enhanced performance [29]. Firms need to ensure that their employees learn how to diagnose, and solve internet bandwidth issues. Training in problem-solving is related to exert self-control in effectively responding to issues that might arise. In most organizations, employees are non-technical people and usually perceive the availability of internet bandwidth as a measure of network performance only. Unfortunately, the extent to which the internet bandwidth is used efficiently is not known to them. If the digital divide measured in terms of bandwidth is not closing, bandwidth inequality has been found to be closely linked to income which is notoriously unequal [30]. Thus, the knowledge of optimizing and utilizing internet bandwidth has become crucial. In some cases, an increasing rate of internet bandwidth may cause more harm than good if employees do not know how they can effectively utilize it or how to solve related problems. In some cases, giving training on the effective utilization of internet bandwidth may yet not solve the problem if employees do not have the understanding of the precise nature of the issue related to their tasks. In answer to the nature of the issues surrounding training in internet bandwidth use, the following hypotheses are formulated:

H2a: The level of training on internet bandwidth of firms will have a positive and direct impact on internet bandwidth needs

H2b: The level of training on internet bandwidth of firms will have a positive and direct impact on internet bandwidth priority.

2.3. A Firm's Level of Performance

Usually the management studies the methods of improving performance at work. In most cases individual-level performance of organizations is the key, whereas in some cases attention is paid to team performance [31]. If an organization effectively improves the performance of individual employees, it accrues to improvements in its level performance as well [31]. Work performance dependent on IT resources and capabilities can be tied to a firm's management capabilities in managing both its internal and external processes. This has been proven to fully mediate the impact of IT on firm performance [6]. Firm level of performance can motivate an employee or group of employees working together to achieve a company's goal. Internet bandwidth utilization can be a determinant of work performance [32]. Despite daily internet usage, time has a large impact on its negative consequences [33] projected that a future internet can achieve autonomy that will allow "users to request and own 'slices' of geographically-distributed host and network resources". This projection is supported by a performance intelligent architecture. Thus, user performance can directly relate to effective utilization of internet bandwidth for the successful implementation of the fundamental services of an organization. While De Stefano et al [34] alleges that broadband use has no statistically significant effect on the performance of firms. However, since the requirement of internet bandwidth for business is increasing and affects work performance [35], this work proposes to explore the impact work performance on the effective utilization of internet bandwidth. Therefore, the hypotheses are formulated as follows:

H3a: The level of performance of firms is positively related to its internet bandwidth needs.

H3b: The level of performance of firms is positively related to its internet bandwidth priority.

2.4. The Internet Bandwidth Needs of Firms

Internet bandwidth needs can be tied to the priority and work performance of a firm. The quality of internet access depends on internet bandwidth speed which reflects how much of it is available. Thus, the more the speed the better the services are that depend on it [1]. The amount of internet bandwidth a firm really needs is dependent on the firm's activities. A firm's activity trying to complete too many tasks online with too little internet bandwidth may be brought to a stand-still. Internet Service Provider (ISP) charge higher rates for faster speed with regards to network neutrality or fair competition by the ISP [36]. Currently, high-speed internet bandwidth is becoming deployed in more and more cities. The important question is how much internet bandwidth SMEs need for their business? SME decision-makers are required to decide on this matter in order to maintain their business success. Based on the Jigsaw Research report of 2014, 78% of five million SMEs in the UK require internet bandwidth for their core business activities. Due to the scale of usage, the report indicates that some SMEs accessed the internet through mobile devices. The key issue is that SMEs need to know exactly how high their internet bandwidth need really is. Nielsen's Law states that internet bandwidth needs to grow at least by 50% per year in order to satisfy this ever rising demand. In most cases, firms need to have a working knowledge and good understanding of the ever-increasing demand for internet bandwidth in order to be effective. Feng [37] reveals that internet access cost and content determine the needs for China's internet coverage. Savage and Waldman [38] pointed out that internet bandwidth needs for rural areas are different from urban areas, and that urban consumers were willing to pay higher rates as they needed the internet more. In order to further proceed along this line of enquiry, the testing of the following hypothesis is proposed:

H4: The internet bandwidth needs of firms will have a positive and direct impact on internet bandwidth priority.

2.5. The Theory of Internet Bandwidth Priority

The technologies that provide Quality of Service (QoS) mechanisms give priority in internet bandwidth, controlled jitter, latency and improved loss characteristics. The MAC Address or IP Address can be used in prioritizing internet traffic between computing devices on the network. The need for SMEs to be given priority in internet bandwidth as its services have to do with requirements linked to the core services they provide necessary to maintain their strength. Hence, giving one service a priority for Internet bandwidth means it is crucial to the survival of a firm. It is prescribed that the quality of service be the tendency of prioritizing different applications to users or data flows or to guarantee a certain level of performance to a data flow. Given that work efficiency is necessary to keep an organization operable is crucial implies that the provision or upkeep of non-essential services or facilities needs to be maintained. Under the current regime for internet access, namely network neutrality, parties are billed only by the internet service provider (ISP) through which they connect to the internet. Thus, pricing is not contingent on the content being transmitted. Recently, ISPs have proposed that content and application providers pay them additional fees for accessing the ISPs' residential clients as well as fees to prioritize certain content. Moody and Siponen [39] suggested a model that predicted the use of internet at work for non-work purposes which was used to

analyse the private and social implications of such fees when the network is congested as more traffic implied greater delays. Conditions were derived under which network neutrality was found to be by far superior to any feasible scheme for prioritizing service. The use of the internet at the workplace increased employee creativity [40] but users were more prone to abuse it [41] although internet policies and monitoring employee behaviour minimized costs and risks for an organization [42]. Thus, given the importance of prioritizing the internet bandwidth, this research aims to further test the relationship between internet bandwidth needs and internet bandwidth priority. As a result, the following hypothesis is formulated:

H5: The internet bandwidth priority of firms will have a positive and direct impact on their internet bandwidth needs

3. Methodology

The previous section provides a thorough formulation of the conceptual model of research. Six constructs were extracted which influenced effective internet bandwidth utilization for business use. This section introduces the research methodology based on quantitative evaluation technique applying the survey approach. The evaluation is designed in order to gain statistical valid quantitative results. It is a hypothesis-testing of user responses with the aim of generalizing the outcomes based on the assumption that factual knowledge can be obtained through the eyes of the researcher.

3.1. Sampling and Data Collection

The population of interest in this study is defined as Malaysian small and medium sized companies. The sample for the study is drawn from a theoretically available population of 3,632 Malaysian SMEs listed in the Multimedia Super Corridor (MSC) Report 2014. No updates have been published following this report but it is believed that the numbers have changed since then. The MSC Report provides names of companies, information on their activities, their operational status, contact information and year of approval. Malaysia has a national Information and Communication Technology (ICT) agenda that identified ICT as a production sector and an enabler of its growth and development strategy in transforming the country into a developed nation in line with its "Vision 2020". As a key ICT policy, Malaysia privatized its communications and broadcasting industries in the late 1980s with the aim of increasing the sector's competitive position [43]. According to the Small and Medium Enterprise Corporation Malaysia (SME Corp. Malaysia), SMEs constitute enterprises with full-time employees not exceeding 50 or with annual sales turnover not exceeding RM 5 million [44].

The selection of the target population was based on explicit criteria defined by the researcher in light of the scope and purpose of the quantitative nature of this research. A simple random sampling was selected in order to ensure equal opportunity to every SME in Malaysia which wished to participate so as to acquire meaningful in-depth data in the population [45]. Individuals were selected randomly and their responses were collected and filtered based on experience in order to yield the greatest amount of data on the topic under investigation.

The primary tool for data collection consisted of a questionnaire. The questionnaire items were designed based on the conceptualization where questions were set for each construct. Some of the questions were adopted [1] and modified from previous related research to suit the present study. The rest of the questions were newly created. The questionnaire was designed using Likert scale type with seven (5) responses ranging from (0) Absolutely, (1) Likely, (2) Neutral, (3) Unlikely to (4) Impossible always.

The targeted number of 350 to 500 responses was gathered randomly within the SMEs that were situated in and around metropolitan Kuala Lumpur and northern and southern

Malaysia. The data collection was performed online and face-to-face, and a total of 323 responses were gathered. 23 completed questionnaires had to be discounted as the respondents had either double-ticked single answers, not answered more than sixty percent of the questions or answered by choosing only single options throughout the questionnaires. All the responses were entered into the SPSS, and the names of the items within each variable were encoded as follows: "Internet Bandwidth Needs (NE)", "Internet Bandwidth Priority (PT)", "Performance (PE)", "Training (PR)" and "Problem resolution (PR)". Furthermore, the groups of the summated items within variable were coded as: "Internet Bandwidth Needs (NEE)", "Internet Bandwidth Priority (PTT)", "Performance (PEE)", "Training (PRR)" and "Problem resolution (PRR)".

3.2. Reliability and Validity Tests

The questionnaires were pre-tested and face validity was conducted, followed by a pilot test of some samples. Thereafter the questionnaire was modified and prepared for both online and face-to-face data collections. The first round of data collected contained the completed questionnaires of 189 participants, and a reliability test was performed and finally an enhanced survey instrument to evaluate the scaled items was developed. Call for response online through social media and self-administered questionnaires were made for about 1200 SMEs in the metropolitan area of Kuala Lumpur. The respondents' views on the prioritization of internet bandwidth needs for in business were collected using the above mentioned scheme. Out of the targeted number of 350 to 500 SMEs, a total of 323 responses were gathered within six months. 19 questionnaires from self-administered questionnaires and four from online responses were discarded as a result of either double-ticking a single question, not answering more than sixty percent of the questions or answering of only single options throughout.

Finally, the raw data were cleaned and organized. The cleaning involved the assessment of missing data, assessment of outliers and the normality test. Thereafter, reliability and validity tests were carried out. The reliability test was conducted on the items using a measure called Cronbach's alpha (α) which shows internal consistency subject to the proportion of the variability in the responses to the items as the result of differences in the respondents' responses [46]. Cronbach's alpha values ranging from $0.7 \leq \alpha < 0.9$ are good and $0.6 \leq \alpha < 0.7$ are acceptable, whereas $0.5 \leq \alpha < 0.6$ are $\alpha < 0.5$ are unacceptable [45]. Thus, the composite reliability values (see Table 1) measured for each construct help verify the reliability of the items. The values ranged from 0.885 to 0.932 and thus presented good internal consistency values which indicated the high reliability of the constructs.

Table 1. Composite Reliability

	NEE	**PRR**	**PEE**	**TRR**	**PRR**
No. Item	6	7	7	6	6
Cronbach alfa	**.885**	**.927**	**.886**	**.932**	**.913**

Convergent and discriminant validity was evaluated by applying average variance extracted (AVE) for the convergent and the square root of the AVE for the discriminant validity. This shows the extent to which a set of measured items actually reflect the theoretical factor of those items designed to measure [45]. The AVG was calculated and their values ranged within 0.84 to 0.90 which indicated a good convergence validity since they were greater than 0.7 [45]. Similarly, discriminant validity was performed, and the variances shared by each construct was also greater than 0.7, and thus the variance extracted was greater than the correlation square. The factor-loading values of all the items were found to be greater than 0.70 (see Table 2) and hence, the values obtained

were above the cut-off value which rendered both the convergent and discriminant validity as acceptable. This result indicated that all the items were loaded more highly on their own factors.

4. Data Analysis and Presentation of Results

The result of the data reduction technique confirmed the findings on the effectiveness and consistency of the survey items. A reasonable number of usable responses was obtained, and the respondent profiles were calculated through descriptive statistics. Thereafter, in order to examine the structure of simultaneous relationships among the research variables influencing the prioritization of internet bandwidth needs in business, multiple regression analysis was used.

Table 2. Inter-construct Correlations

Factors	Factor-Loading				
NE1	0.806				
NE2	0.942				
NE4	0.764				
NE6	0.886				
PE4		0.902			
PE5		0.941			
PE6		0.877			
PR1			0.934		
PR4			0.897		
PR7			0.853		
PT1				0.835	
PT2				0.924	
PT3				0.801	
TR1					0.879
TR2					0.876
TR3					0.891

4.1. Response Rate on the Respondent Profiles

The details response rate on the profile of respondents is summarized in Table 3 as follow.

Table 3. Profile of the Survey Respondents

Demographic Variables	**Item**	**Frequency**	**Percent**
Age Group*			
	15 – 24	33	11.0
	25 – 34	40	13.3
	35 – 44	143	47.7
	45 – 54	68	22.7

	55 and above	16	5.3
Gender*			
	Male	73	24.3
	Female	227	75.7
My Internet Bandwidth for work related tasks in my company is:			
	Occasionally	19	6.3
	Almost every time	27	9.0
	Every time	254	84.7
The following category best describes my company's primary Internet usage:			
	Web Surfing, Image Transfers, Database Access and Transaction Processing	92	30.7
	Web Surfing, Image Transfers and Transaction Processing	47	15.6
	Web Surfing and Transaction Processing	35	11.7
	Video and Audio Streaming	50	16.7
	Database Access and File Sharing	22	7.3
	Video Conferences	1	0.3
	Transaction Processing involving voice, audio, video and text	29	9.7
	Others	24	8.0
The current number of internet users in your company is:			
	1 – 5 users	67	22.3
	1 – 10 Users	18	6.0
	1 – 15 Users	16	5.3
	1 – 20 Users	52	17.3
	1 - 25 Users	6	2.5
	1 – 30 Users	5	1.3
	More than 30 Users	136	45.3

From Table 3, the demographic variables of the respondents with respect to their prioritization of internet bandwidth needs in business are presented. Out of 300 respondents, about 227 (75.7%) were female and 73 (24.3%) were male. This distribution indicated that the number of women in Malaysian SMEs willing to participate in the survey was much higher than compared to the men. In terms of age, about 143 (47.7%) respondents belonged to the age group of 35 to 40-year olds. This constituted the largest age group in the distribution, and indicated that the majority of the SMEs personnel was relatively young. Only very few respondents were within the age group of 55 years and above 16 years (5%) which formed the smallest age group. The next aspect of the

distribution concerned the internet bandwidth use for work-related tasks. The 254 respondents (84.7%) reported that their internet use at any time involved work-related tasks. Considering this high percentage of responses, SME personnel used the internet bandwidth for nearly only work-related tasks. The fact that 19 respondents (6.3%) only occasionally used the internet involving work-related tasks suggested that the internet bandwidth provided by their companies was either ill-used or under-used. Various companies have priority on their internet usage, and most respondents used its major functions for web surfing, image transfers, database access and transaction processing culminating into about 30% of the distributions. In terms of the range of internet users, the majority of company personnel (more than 30 people on average) used the internet. Other details could be extracted from the respondents, yet the above described factors constituted those demographic factors considered most relevant to this study.

4.2. Analysis of the Relationship among the Variables and Presentation of the Results

The relationship among the variables of the factors influencing the prioritization of internet bandwidth needs in business constituted the final step toward testing the formulated hypotheses. Thus, both correlation and multiple regression analysis were used and measured using the SPSS tool. Summated items on each variable were computed on a summated scale, where several items are combined to measure a single variable in the attempt to increase the reliability of the measurement [45].

The result of the correlation among the variables indicated that the values of the Pearson's correlation coefficient (*r)* ranged from *r* = .625 to .854 (see Table 4). The highest correlation coefficient was obtained from the relationship between internet bandwidth needs and internet bandwidth priority, which showed a significant strong positive correlation relationship. This indicated that these two were dependent variables signifying that if internet bandwidth needs increased, internet bandwidth priority also increased and vice versa. However, there was also strong relationship between internet bandwidth needs and all the remaining variables while only a relatively moderate relationship could be observed between performance and training.

Table 4. Result of the Pearson's Correlation Coefficient (r)

	NEE	**PTT**	**PRR**	**PEE**	**TRR**
NEE	1				
PTT	.854**	1			
PRR	.774**	.705**	1		
PEE	.722**	.780**	.703**	1	
TRR	.804**	.712**	.767**	.625**	1

In order to do in-depth analysis, standard multiple regression analysis was conducted to evaluate how well a set of predictors predicted the prioritization of internet bandwidth needs in business. The predictors were "Performance (PEE)", "Training (TRR)" and "Problem resolution (PRR)", while the criterion variables were "Internet Bandwidth Needs (NEE)" and "Internet Bandwidth Priority (PTT)". The linear combination of "Performance (PEE)", "Training (TRR)" and "Problem resolution (PRR)" (See Table 5 and 6) were significantly related to "Internet Bandwidth Needs (NEE)" and "Internet Bandwidth Priority (PTT)" at F(3, 296) = 285.599, p=.000 at .05 alpha level, and F(3, 296) = 225.059, p=.000 at .05 alpha level respectively. Treating this first regression analysis for which "Internet Bandwidth Needs (NEE)" was the dependent variable excluding "Internet Bandwidth Priority (PTT)", all independent variables were well contributed for the prediction of the dependent variable at a standardized beta of (PRR= 0.235, PEE =0.275, TRR = 0.451). The highest prediction impact came from "Training (PRR)" which

contributed 45% of the model while performance contributed the least with 23% contributions to the model. In the model where "Internet Bandwidth Priority (PTT)" was set to be the dependent variable, two independents variables made good contributions for the prediction of the dependent variable at a standardized beta of (PRR 0.110, PEE 0.510, TRR 0.309). Performance (PEE)" was found to give the highest prediction contribution of 51% to the model whereas "Problem resolution (PRR)" only showed 10% impact to the prediction contribution of the model. This result suggested that in both cases, "Performance (PEE)" and "Training (TRR)" made the highest impact on prioritization of internet bandwidth needs in business.

Table 5. The Regression Model for Internet Bandwidth Needs as the Dependent Variable

Model 1	B	Beta	T	Sig
PRR	0.667	0.235	4.576	.000
PEE	0.504	0.275	6.526	.000
TRR	0.107	0.451	9.652	.000
R2	0.743			
Adjusted R2	. 741			
F	285.599			
Sig	.000			

Table 6. The Regression Model for Internet Bandwidth Priority as the Dependent Variable

Model 1	B	Beta	T	Sig
PRR	0.137	0.110	1.972	.050
PEE	0.557	0.510	11.099	.000
TRR	0.404	0.309	6.057	.000
R2	.695			
Adjusted R2	.692			
F	225.059			
Sig	.000			

The analysis is suitable for the proposed model as it is comprised of both multivariate analysis (there are two dependent variables) as well as multivariable analysis containing multiple independent or response variables. Multiple stepwise regressions was also used in order to assess the relationship between a number of variables and to obtain the best predictors [47]. The stepwise regression approach computes multiple regressions a number of times, removing in each step the weakest correlated variable the best variables are found that explain the distribution [45]. Based on the coefficient result of this study on stepwise multiple regressions (See Table 7), all of the independent variables made a statistically significant contribution to the prediction of prioritizing internet bandwidth needs in business. "Performance (PEE)" (Beta = .51, p = .01 at .05 alpha level) made the strongest contribution to both models, followed by "Training (TRR)" (Beta = .30, p = .00 at .05 alpha level) and "Problem resolution (PRR)" (Beta = .11, p = .05 at .05 alpha level). In both models "Internet Bandwidth Needs (NEE)" and "Internet Bandwidth Priority" functioned as the dependent variable. This result indicated that the "Problem resolution (PRR)" did not make any significant contribution.

Table 7. Result of the Stepwise Multiple Regression Model

NEE Model		Standardized Beta	t	Sig.	Model Summary	
					R^2	Adjusted R^2
1	PEE	0.78	21.534	.000	0.609	0.607
2	PEE	0.55	13.311	.000	0.691	0.689
	TRR	0.368	8.904	.000		
3	PEE	0.51	11.099	.000	0.695	0.692
	TRR	0.309	6.057	.000		
	PRR	0.11	1.972	0.05		
PTT Model		Standardized Beta	t	Sig.	Model Summary	
					R^2	Adjusted R^2
1	PEE	0.78	21.534	.000	0.646	0.645
2	PEE	0.55	13.311	.000	0.725	0.723
	TRR	0.368	8.904	.000		
3	PEE	0.51	11.099	.000	0.743	0.741
	TRR	0.309	6.057	.000		
	PRR	0.11	1.972	0.05		

5. Discussion

The purpose of this study was to investigate prioritization of internet bandwidth needs in business. The analysis covered demographic background variables, internet bandwidth needs, internet bandwidth prioritization and the major factors that influenced the impact of these variables. The goal of this study was to provide empirical data which could be used to provide a framework for a new model of prioritization of internet bandwidth needs in business based on the synthesis of the existing models. In addition, the data and the framework could be used by SMEs to plan, redesign, provide and maintain effective and efficient internet bandwidth. This research study used a quantitative method for data collection through questionnaires as the major data collection instrument. Statistical hypothesis testing was performed in order to see the area of agreements, concurrences and disagreements of this study with other related findings.

The hypothesis testing was carried out with 300 respondents selected randomly from individuals working in SMEs in Malaysia. Most of them were women belonging to the age group of 35-40. The descriptive analysis revealed that majority of the respondents used internet bandwidth for work-related tasks much more often than for non-work related tasks. These major tasks consisted of web surfing, image transfers, database access and transaction processing and formed about 30% of the distributions of the SMEs. Based on these data, the research hypothesis testing showed high positive correlations coefficients obtained from the relationship between internet bandwidth needs and internet bandwidth priority and thus suggested that increased internet bandwidth needs meant an increased internet bandwidth priority. This proved hypothesis 4 to be true. Furthermore, the impact of internet bandwidth priority led to a direct and opposite impact on the internet bandwidth needs. Hence, hypothesis 5 was also accepted.

Following this, is the stepwise multiple linear regression model summary and overall fit statistics for the testing of hypotheses 1 to 3. It was found that the adjusted R^2 of the model for which internet bandwidth needs acted as the dependent variable was 0.692 with the $R^2 = 0.695$. That meant that the linear regression explained 69% of the variance in the data. On the other hand, the adjusted R^2 of the model for which internet bandwidth priority acted as the dependent variable was 0.741 with the $R^2 = 0.743$, that meant that the linear regression explained 74% of the variance in the data. Based on these findings, it

could be concluded that the model whose internet bandwidth priority acted as the depended variable fit more with the independent variables than the model whose internet bandwidth n needs served as the dependent variable. All the hypotheses were supported, although in both models the predictors showed numerous contributions except for "Problem Resolution". Thus, the findings suggested that if performance and training improved, so did internet bandwidth needs and the internet bandwidth priority. In short, internet services contributed to the requirement for the prescribed levels of quality [48]. Priority should be given to the tasks that require internet bandwidth most. Companies must ensure that the internet bandwidth required for the company's tasks is available. Hence, instead of companies implementing their policies on monitoring the use of internet bandwidth, the proposed research model allows employees to use their company's internet bandwidth at work for non-work purposes while at the same time effectively utilize the internet bandwidth for work purposes.

6. Conclusion

This study has examined the prioritization of internet bandwidth needs for business purposes. It provides an empirical investigation that comes up with a new model based on the analysis of demographic variables, internet bandwidth needs variables, internet bandwidth prioritization variables and a set of independent variables as the major factors that impact the dependent variables. A quantitative methodology is used for data collection in the form of questionnaires. The research is a hypothesis testing aimed at generalizing the outcome. Therefore, statistical hypothesis testing is performed in order to gain support or agreements or concurrences with the research findings and to establish where disagreements with other findings occur. The results of the hypothesis testing indicate positive and high correlations coefficients between internet bandwidth needs and internet bandwidth priority and the suitability of the statistics model in representing all given variables. Thus, it can be concluded that internet bandwidth priority and internet bandwidth needs ensure a balance in using the internet at work for both work and non-work related tasks.

This is only possible if work performance and training of the individual SME employees working on the internet improves. Thus, the use of internet bandwidth for businesses purposes has to be measured by work performance and training. This study has proven that the use of a company's internet bandwidth at work for non-work related purposes does not mean that it diminishes the work performance. However, the internet bandwidth needs and priority remain the central issues. Once the required internet bandwidth is made available, and priority is given to the company's core tasks, the effective use of internet bandwidth for business purposes is ascertained. This study contributes to the creation of an effective internet bandwidth utilization model for business firms which has been tested and proven empirically. The general conclusion is that companies -- rather than criticizing and chastising employees for using the internet for private purposes while at work and thus ill-using the firm's bandwidth – simply alter the processing priority of work-related versus socializing applications, for example ensuring that accounting transactions possess faster processing time than uploads on Facebook.

Acknowledgment

This research is supported by an International Islamic University Malaysia research grant under the Foundation Research Grant Scheme (FRGS15-245-0486). We would like to thank Causal Productions for permits to use and revise the template provided by Causal Productions. Original version of this template was provided by courtesy of Causal Productions (www.causalproductions.com).

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