EMPIRICAL INVESTIGATION ON SATISFACTION AND SERVICE QUALITY LEVEL OF RADICAL PROCESS CHANGE IMPLEMENTATION

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ABSTRACT

The paper reviews the literature related to the implementation of radical process changes in higher education (HE) environment. Several issues and implementation results related to radical process change in HEIs, particularly business process reengineering (BPR), are being investigated. Furthermore, as the implementation of process change would have an impact in HEIs, specifically on service quality and customer satisfaction, this paper discusses both concepts. A survey has been developed to assess the students' satisfaction of the radical process change implemented in one of the HEIs, namely HEI-A which was selected as a case study. The results indicate some significant differences among groups for both satisfaction and service quality measured. The paper provides a framework for future research to develop a metric for measuring satisfaction and service quality level in HEIs. This research contributes to studies of BPR in HE context, by focusing on the key processes performance.

Keywords: *Radical; process change; reengineering; education; SERVQUAL; SERVPERF; service quality, satisfaction.*

ABSTRAK

Artikel ini mengulas kajian yang berkaitan dengan perlaksanaan perubahan proses radikal di persekitaran pengajian tinggi. Beberapa isu dan hasil daripada perlaksanaan perubahan proses radikal, khususnya proses perekasayaan semula

telah diselidiki. Seterusnya, disebabkan perlaksanaan perubahan proses ini akan memberikan kesan ke atas institusi-institusi pengajian tinggi (IPT), khususnya yang berkaitan dengan kualiti servis dan kepuasan pelanggan, artikel ini membincangkan kedua-dua konsep tersebut. Soal selidik telah dibentuk untuk menilai kepuasan pelajar terhadap perubahan proses radikal di sebuah IPT, iaitu HEI-A yang dipilih sebagai kajian kes. Hasil kajian menunjukkan perbezaan yang signifikan terhadap pengukuran kepuasan dan kualiti servis bagi kumpulan yang berbeza. Artikel ini menyediakan rangka kerja terhadap kajian masa hadapan untuk membangunkan metrik bagi mengukur tahap kepuasan dan kualiti servis di IPT. Penyelidikan ini memberikan sumbangan terhadap kajian proses perekasayaan semula dalam konteks pengajian tinggi, dengan memfokuskan kepada pencapaian proses-proses utama.

INTRODUCTION

Higher education institutions (HEIs) play some important roles for the nation and are continuously expanding its role for betterment from time to time in order to fulfil the requirements. Obviously, it also plays several important roles in society and the economy. Therefore, we realise that this topic is important for discussion to see how HEIs continue changing for improvement. Specifically, in this millennium, many HEIs have started changing radically with bold actions (McAdam, 2001). The Government has put in place quality assurance mechanisms to monitor and regulate the quality of HE in both public and private sectors. In order to provide world-class education as a competitive weapon for getting more students, HEIs have to carry out acceptable quality performance, particularly in their key processes. King (1995) states that the growth of HEIs means more choices for the student, not only the local but also the foreign students.

In addition, it is important for HE to be highly recognised as excellent in performance worldwide (King, 1995; Roffe, 1998). These studies also highlight that the drive for quality in education (for example in education content, the delivery modes and strategies, and the applicability of educational knowledge and experiences in the real world of work and nation building) would create a demand for 'reengineering' to come in, in order to produce fast results. Ibrahim (2000) states how hard it was to reach the standards of education excellence experienced by certain developed countries like the USA, UK, Australia, or Germany. However, it is not impossible to 'leap-frog' to improve radically by implementing the right approach and appropriate actions.

THEORETICAL BACKGROUND

Roles of Higher Education

There has been little serious consideration of what higher education is and what it is for (Fulton & Ellwood, 1989).   In their book highlighted five main purposes for higher education: skill development, selection, socialisation, scholarship and service. Table 1 summarises the roles of higher education as mentioned by the authors.

Table 1
Roles of Higher Education

Roles	Emphasise
Skills development	• Vocational and liberal • General and specific • Personal/transferable and subject-based
Selection	• Scales to identify and accredit individuals with higher-level abilities of certain kind • Individual will benefit from the process by being selected for future employment
Socialisation	• Socialising its participants for their future roles • Reinforcing and forming their values and behaviour to fit them for their intended professional and personal niches
Scholarship	• Advancement of learning • Extension into research
Service	• Responsibility to serve local industry and the community through consultancy, applied research, and even advocacy • Being part of the wider society

Fulton and Ellwood, (1989).

Others have elaborated on these roles. For example, Ruth, (1998) amplifies the 'scholarship' role noting HE's special contribution in creating a place for discovery, synthesis, reflection, and evaluation of knowledge. In addition, King (1995) identifies creation of new knowledge or value added knowledge, through discovery, research and development as important to promote education excellence.

HE plays an important role in realising the vision towards academic excellence and professional and technical enhancement, whilst meeting

the manpower needs of the nation. Specifically, HEI roles were to provide sufficient educational infrastructure, as well as to increase the capacity to meet the demand for HE. The existence of a private sector has often been explained by the supply of more places for students toward scientific and technological subjects.

Another role of Malaysian HEIs is in 'skill development' as in Table 1. For example, the Government has called on the private HEIs to help meet social responsibility, thus including in the 8th Malaysia Plan (2001 to 2005), for example Item 4.7.1, that "The role of the private sector is supplementing public training institutions is vital, especially in the provision of technical and industrial resources…"

Moreover, the 'socialisation' role was also mentioned by the Minister of Education in the Fifth SEAMEOINNOTECH Conference in 1995.

> "…. to globalise our education, to seek knowledge everywhere and open our minds to face new challenges. It could also mean knowing what we do not know, to be aware that there is more to learn, and to have the initiative to invent and not just to innovate. But most importantly, a world class education system must develop a human being of character with strong moral values, a wholesome person (not merely an academic one), imbued with intellectual capacity to deal with the future challenges. Towards this end, it is vital to have passion to pursue ideas, and to possess the scientific and philosophical spirit in such knowledge to be driven by the culture of excellence."
>
> (Quoted in Ibrahim, 2000)

This statement is parallel to fulfilling the national requirements and to achieving Vision 2020. Malaysia is a rapidly developing economy and society with specific government plans for its development. This means both an increased pressure on, and opportunities for HEIs in Malaysia. In response to these opportunities many private HEIs have engaged in rapid growth and have outstripped their original businesses processes. Moreover many new private HEIs have been created generating much competition in the market. Thus, in order to survive and continue to grow, the older private HEIs have had to engage in radical transformation of their processes.

Therefore private HEIs should increase their standards and quality, which directly would make them more confident in their business education. As a result, an increasing number of private HEIs have

widened their operations to get more students, such as by implementing distance learning and by collaboration with local public universities and also foreign universities (Low & Wilkinson, 2000).

There is pressure on HEIs for step change in performance and some there is evidence that HEIs are using radical process change to achieve this (Bryant 1998a; McAdam 2001). We believe that the idea of a breakthrough transformation or radical process change could shorten the normal development of HEIs to become world-class in education. Supposedly, the implementation of changes in the HE environment should happen smoothly, since the main activities in this environment involve knowledge exchange and provide large opportunities for organisational learning (OL). Thus, Denton (1998) stresses that OL, by emphasising change, adaptability and the utilisation of new knowledge, can offer a way of detecting and filling the gaps between theory and effective practice. It is concluded that the definitions of OL all emphasise the need to change and adapt, the need to look outside the organisation and, most importantly, stress that learning must not just take place for its own sake, but must result in a change in the organisation's behaviour and 'action patterns'. The following sections discuss the prospect for process change in HEIs.

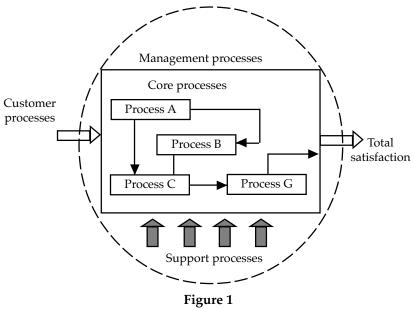**Radical Process Change Implementations**

In many books and international journals, most of the authors, such as Denton (1998), Flower (1998), and Tong and Han (2003) when discussing survival and competitive advantage among HEIs, stress "changes". For example, Denton (1998) stated that change is needed for an organisation to survive and become a part of the organisational life cycle. His book stresses that long-term fundamental changes in the business environment inevitably call for major changes in a company's strategic direction. These may be as a result of economic changes, such as globalisation, technological or social changes. Additionally, Tong and Han (2003) highlight how important is quality improvement for HEIs, such as innovation and change. They argue that many HEIs have enormous potential to respond to the educational challenges, and should act like a commercial enterprise challenged by economic forces.

Interestingly, Johnson, Rush, Coopers, and Lybrand (1995) stresses that to achieve the systemic changes needed in HE today requires more dramatic approaches than total quality management (TQM) and other traditional measures. This is because HE needs to operate efficiently and effectively in order to fulfil the requirements from its environment,

more so to respond to the rapidly changing environment. Specifically, teaching and learning process in HEIs, including colleges and universities, should change in order to stay competitive and to fulfil customers needs (Flower, 1998). Customers are the individuals who get service or product. Therefore, this researcher believes that one of the approaches suitable for these needs and the turbulent environment is a radical process change.

Past studies have shown the application of BPR started somewhere in 1990, as elaborated in Johnson *et al*. (1995) who discusses the implementation of BPR in the United States. This happened as a result of competitive pressures and increasing demand in customer needs. Customers had become more sophisticated and demanding. It was also because of the need for efficiency and effectiveness in HEI operations, such as the need to provide excellent teaching performance, and adequate education infrastructure and facilities. However, a breakthrough process change, and specifically BPR implementation in HEIs, is still rare and not as popular as in manufacturing and healthcare sectors, since there are just a few studies in this area, and if there is a study, only a few HEIs have implemented a radical process change. For example, MacBryde (1998) identified out of 54 universities in the UK, only 25 (46%) had implemented reengineering. The results of MacBryde's work is that the nine of the universities had embarked on BPR between 6 and 12 months previously, six had done it over 24 months before, five had started it 12 to 18 months before, five others had embraced BPR 18 to 24 months previously, and three universities had started it less than 6 months before. Among the several universities implementing BPR, University of Pennsylvania, is one of the universities to link the re-engineering of business processes and the development of an architectural foundation for information and systems (May, Gordon, Beek & Arzi, 1993).

These efforts mainly focused on management and administration aspects in order to accomplish the academic mission. Therefore, the effort was much on administration side considerations, for example particularly in enrolment procedures, admission and financing (Johnson *et al*., 1995), which are also core processes for the organisation. It should be understood from the works of many popular BPR researchers, such as Davenport (1993b) and Hammer and Champy (1993), who define core process as a set of linked activities that both crosses functional boundaries and also external boundaries of the organisation, and address the needs and expectations, extending into suppliers and customers. Childe *et al*. (1994) identified core process as synonymous with 'operate process', and it is connected to satisfying

the requirements of the external customer (Childe, Maull & Bennett 1994; Maull & Childe 1994).

We believe that in process change or BPR there is a need to identify the core or the key processes of the organisation for breakthrough change, in order to get ultimate benefits for the whole organisation. The impact of process change happening in the core processes would result in customer satisfaction, as shown in Figure 1.

Figure 1
Core process impact on customer satisfaction

Ould (1995) showed this relationship through the diagram, in which core processes concentrate on satisfying external customers and responding to a customer request and generating customer satisfaction. Besides, support processes concentrate on satisfying the internal customer, and might add value to the customer indirectly by supporting a core process. Finally, management processes concern themselves with managing the core processes or the support processes, or they concern themselves with planning at the business level.

Fulton and Ellwood (1989) state that core processes are becoming a crucial part of HEIs. These researchers stress that there is a need for changes in teaching and assessment. They point out the major changes that happened in most HEI in Uk were in cost structures and content.

The integration suggested in the Fulton and Ellwood (1989) study mainly focuses on three related approaches that are TQM, BPR and information re-engineering. The BPR has been done in procurement, disbursement and compensation. Although this study has shown the experiences in doing BPR, it has failed to demonstrate that the actual BPR project carried out was supported by data analysis, whether qualitative or quantitative.
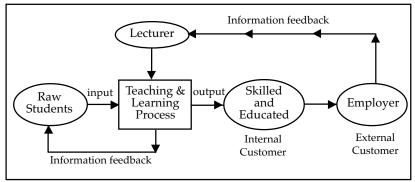
Furthermore, past literature has shown that the emphasis on BPR was on certain critical business processes, particularly those involved in teaching and learning. Fulton and Ellwood (1989) state that change in the teaching and learning process is needed in order to meet customer requirements. Therefore, this process becomes a major part of the change implemention. To make this happen, it should involve innovation so that the change would benefit the whole organisation in the long term, as stressed by

Service Quality and Customer Satisfaction in Higher Education (HE)

It should be pointed out that the core for HE is services, and therefore the need to emphasise service to deliver quality to the customer. Many studies state that the centre of service quality was the customer (Kang & Bradley, 2002; Zeithaml & Bitner, 2003).Therefore HE should clearly define the customers in its environment. Kanji and Tambi (1999) specify five types of customers in the HE context, which are employees, employers (government and industry), broad community and students.

On the other hand, Tong and Han (2003) came out with a model which perceives students as both customer and employee (Figure 2). To grasp the importance of this model it is really important to satisfy student (internal customer) needs to enable them to learn more. In addition, the student is also an employee, where lecturer and student work together to achieve a teaching and learning objective. Therefore both of them would move towards achieving this objective by participating in the process of teaching and learning, for example the lecturer in making decisions and the student in giving feedback. Tong and Han (2003) work on TQM application is adopted in this study as it was found relevant for a process change perspective to look at how important the teaching and learning process is in the HE environment.

Many studies claimed that the conceptualising of the quality of services is more complex than for goods or products, and it should be seen through customer eyes (Parasuraman, Zeithaml & Berry, 1985; Palmer 2001). This is because unlike in goods or products, quality can be

(Source: Tong & Han, 2003)

Figure 2
Students as both customer and employee

measured straight away by looking at their tangible attributes. The researcher agrees with Parasuraman *et al.* (1985) who noted that service quality involves more than outcome; it includes the manner in which the service is delivered. Furthermore, the researchers have identified four gaps in the model proposed:

1. customer expectations versus management perceptions of customer expectations.
2. management perception of customer expectations against the translation of those perception into service quality specifications.
3. service quality specification opposed to service delivery.
4. service delivery in opposition to external communication of it to customers.

It should be noted that this gap analysis model focused on the entire organisation. Zeithmal and Berry (1988) have developed a model for the measurement of the service quality, which they have called SERVQUAL "A survey instrument designed to assess service quality along five specific dimensions consisting of Reliability, Responsiveness, Assurance, Empathy, and Tangibles dimensions" (Table 2).

Parasuraman *et al.* (1988) claimed this tool demonstrated convergent validity and reliability for the measurement of customer perceived service quality and was applicable across a range of services and in many countries. However, the validity and reliability of the scale have been highly debated, for example in Cronin and Taylor (1992). In their study, they claimed to show that 22 items adequately defined the domain of service quality, although the items that define service quality in one industry may be different from another: there may be some generic factors and some factors specific to different services.

Table 2
Dimensions of SERVQUAL

Dimensions	Descriptions
Reliability	Ability to perform promised service dependably and accurately
Responsiveness	Willingness to help customers and provide prompt service
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence
Empathy	Caring, the individualised attention firm provides its customers
Tangibles	Physical facilities, equipment, and appearance of personnel

Some of the organisations that implemented BPR because of the customer orientation, for instance Ascari, Rock and Dutta (1995) and Kim (1998), found that the emphasis on customers was mainly to gain a long-term profit for the organisation and sustainable competitive advantage. Edvardsson and Gustavsson (1991)recognised that many organisations had measured their service quality performance to pursue change in order to fulfil customer requirements and to increase their satisfaction. Hope and Muhlemann (1997) raised the debatable issue of the definition of service quality and satisfaction. They have defined satisfaction as meeting or exceeding the requirements of the customer. Satisfaction is sometimes seen as what results from one encounter. According to Gronroos (1984), customer satisfaction is the degree of fit between customer expectations of service quality and the quality of the service as perceived by the customer. Service quality relates to the performance of a service over a period of time. In order to give a better understanding to these two concepts, Hope and Muhlemann (1997) gave the example that if a customer on each visit to a service provider is satisfied with each outcome, the service may then be described as one of quality. In their work have discussed the unsolved debates on both 'service quality' and 'satisfaction' terms, which some of the researchers used interchangeably, closely related and linked together, or distinct. Table 3 specifies the main differences in both constructs.

There is a clear overlap between the construct of satisfaction and service quality, and there exists a strong relationship between satisfaction and service quality, as mentioned in Palmer (2001). Simply stated, the

Table 3

Main Differences in Service Quality and Satisfaction

Researchers	Main differences
Parasuraman *et al.* (1988)	Satisfaction could be measured by looking at customers who received a specific transaction and to what extent it met their expectation. Whereas service quality related to the comprehensive evaluation of service experience.
Cronin and Taylor (1992)	Satisfaction is a superordinate construct to quality. Service quality is antecedent to satisfaction.
Teas (1993)	Satisfaction resulted from specific transactions in which customers evaluate different kind of services they received. However, the service quality was measured through a global perspective.
Spreng and Mackoy (1996)	Indicated that service quality and satisfaction were distinct. However, there is not a good understanding of their relationship. Additionally, performance is compared in producing satisfaction.
Proctor (1997)	Specified a clear overlap between both constructs, where customers who were satisfied perceived the same feeling for service quality.

customers will feel satisfied if they get what they expect from the service. If they get it over an extraordinary level above what they expect, they might say that organisation has offered excellent service quality. Therefore, to the researcher's knowledge, service quality is related to performance, and satisfaction is related to disconfirmation.

Vavra (1997) clearly states that the customer's recognition of performance is the most easily measured, and to determine the satisfaction is the condition to which expectation are met or not, or exceeded. In addition, Zeithaml and Bitner (2003) defined satisfaction as follows:

> "…the customers' evaluation of a product or service in terms of whether that product or service has met their needs and expectations. Failure to meet needs and expectations is assumed to result in dissatisfaction *with the product or service.*"

From the literature review of works on service quality, the present researcher considers that service quality and satisfaction are not

distinct but are interrelated. This view is shared by researchers such as Parasuraman *et al.* (1998), Teas (1994) and Hope and Muhlemann (1997) who state customers who are satisfied with the service they encountered would perceive that they had received a quality service from the service provider.

Brady, Cronin, and Brand (2002), and Cronin and Taylor (1994) argue that a more appropriate measure of service quality is the perception scale or SERVPERF, as it is simpler for respondents to complete. The measurement of expectations is to allow respondents to compare directly expectations with perceptions of performance. The questionnaires are distributed after the service is encountered and asked whether it was perceived to be better or the same or worse than they had expected. Proctor (1997)suggests that the perception only scale would ideally need to be developed in the service specific context, based on exploratory work with relevant customers. That is why in this present research, the performance-only measure was used and found to be more accurate and straightforward, as all the students have experienced the service, particularly the process delivery provided to them.

To recap, in HEIs students are one of the major customers and HEIs must concerned to ensure they will be satisfied with the service and product delivered. There is empirical evidence that perceived service quality leads to satisfaction (Cronin & Taylor, 1992), but must recent debate on whether satisfaction with service lieads to perceptions of service quality found, for example in Cronin and Taylor (1994)Parasuraman *et al*. (1988) and Zeithaml and Bitner (2003). According to Cronin and Taylor (1994) customers will be more satisfied if they get a maximum level of perceived service quality. However, the customers who were not satisfied will tell others about the poor quality of service they received from the organisation (Zeithaml & Bitner, 2003)

Cronin and Taylor (1992) compared five models and found empirical evidence that supported the direct influence of service perceptions on perceived quality. As discussed earlier, their work had come up with a performance-only version of SERVQUAL which directly measured disconfirmation by measuring straight away the expectations and actual process delivery to customers. Proctor (1997) states that the customers' cognitive script defines their expectations of the service environment, the roles of the different players, the waiting times and the facilities available.

In addition, they are several studies determining the experiences and expectations of students in their perception of academic service given.

Generally, Zeithaml and Bitner, (2003) states how to manage a variety of customer segments, such as in the educational environment, in which there exist some particular characteristics of service which the organisation needs to manage well. This study suggests that the organisation should rely on a variety of strategies. Proctor (1997) states that satisfaction contains a two stage process: 1) the formation of expectations, from external cues (such as advertising or price), or internal cues (such as past experiences); 2) the disconfirmation judgement or comparison of the expectations to perceptions of the service performance. Cuthbert (1996) did a service quality study in HE and used the SERVQUAL instrument with some modifications to make it applicable to the HE context. This study agreed that service quality depends not on the absolute level of performance that is experienced, but the performance relative to the expected performance.

There are debates on how expectations affect satisfaction, therefore some authors have argued against the measurement of both constructs at the same time. For example, O'Neill *et al. (1998)* suggest that customers modify their expectations as they experience the service. Therefore researchers like Brady *et al*. (2002), Cronin and Taylor (1994), and Kang and Bradley (2002) have used a performance-only measure, SERVPERF. For example, Cronin and Taylor (1992;1994) stressed that this stressed measurement was more accurate and reliable since the perceived level of service quality and satisfaction is not highly affected by expectation. Teas (1993) argued the inappropriate interpretation of P-E scores, and therefore concluded that the SERVQUAL perceived quality framework may not be theoretically valid, which is in line with

To our knowledge, there has not been any standard or benchmark, particularly in HE, to reflect the satisfaction level of the customers. Although according to SERVQUAL authors, when perceptions exceed expectations it shows satisfactory or high quality service. However, this may not be the case, for example when expectations of the service are low or ill-informed.

What this research is concerned with is inline with the criticism in Proctor (1997) who questioned about there being a need for a standard benchmark for customer satisfaction to be established and further developed in SERVQUAL. Therefore, it is suggested here that the lack of a standard measurement should be further researched to provide an accurate measurement of satisfaction index. It is further indicated that one possible alternative to meet this lack of standard is that the organisation itself needs to establish the standard from a customer viewpoint. In this case, the HEIs should establish the standard for a benchmark of customer satisfaction across all service industries,

including HE. Although Abdullah and Husain (2002) promoted the Malaysian Customer Satisfaction Index (MCSI) for most service industries, they failed to include HE. Zeithaml and Bitner (2003) states, "service performance indexes are comprehensive composites of the most critical performance standard", which are built by most companies; however, not all these indexes contain customer-defined standards.

RESEARCH METHODOLOGY

Sampling Frame and Sample Size

Zikmund (1991) states that the sampling frame as the list of elements from which the sample may be drawn. Therefore, this author suggests the importance of determining the population elements in the study before choosing a sample, in order to ensure accurate sampling units. Sampling techniques provide a range of methods that enable the researcher to reduce the amount of data needing to be collected by considering only data from a sub-group rather than all possible cases (Saunders, Lewis, & Thornhill, 1997). Many authors, such as Cooper and Schindler (2001), Rummel and Ballaine (1963), Saunders *et al*. (1997), Sekaran (2000), and Zikmund (1991) identified two types of sampling techniques, namely probability and non-probability sampling. By analysing the different approaches to these, the researcher found that stratified sampling was more accurate and promising to reflect the population on the basis of the criterion or criteria used for stratification. The reason for taking this approach is to have a more efficient sample when differentiated information is needed regarding various strata within the population, and it could be taken on the basis of simple random sampling. Similar to this context, the student evaluation questionnaire was based on different student programmes in the case study. However, the researcher noted the need to obtain as high a response rate as possible to ensure representativeness, as suggested by previous studies, for example Zikmund (1991). The sample of respondents included both full-timers and part-timers, since they are perceived as being major customers for that case HEI-A. Table 4 shows the calculation of the sample size for this case study.

For each group of students, the researcher used a personally administered questionnaire as suggested in Sekaran (2000) and the researcher had to go to their classroom and ask their favour to answer the questions, usually at the beginning of the class. They took approximately 15 to 20 minutes to answer the questions, including a

Table 4

Stratified Sampling for Student Evaluation

Programme sampling	Number of students	Stratified random sample
PreHND	$N_1 = 386$	$(N_1/N) \times n = n_1 = 90$
HND in telecommunication	$N_2 = 113$	$(N_2/N) \times n = n_2 = 26$
HND in engineering and computing	$N_3 = 91$	$(N_3/N) \times n = n_3 = 22$
HND in engineering and business information technology	$N_4 = 83$	$(N_4/N) \times n = n_4 = 20$
HND in electrical engineering	$N_5 = 310$	$(N_5/N) \times n = n_5 = 72$
HND in electronic engineering	$N_6 = 143$	$(N_6/N) \times n = n_6 = 33$
HND in medical electronic engineering	$N_7 = 82$	$(N_7/N) \times n = n_7 = 20$
HND in electrical/ electronic (part-time)	$N_8 = 61$	$(N_8/N) \times n = n_8 = 14$
Total	**N = 1269**	**n = 297**

5-minute brief explanation about the questions. Most of the lecturers who conducted the class at that time agreed to let the researcher meet the students during their class hours. Otherwise, the researcher handed over the questionnaires to the lecturers to distribute to the students and then collect them within two weeks in the lecturers' room.

Survey Questionnaires

Bell (1999) stressed that a well-designed questionnaire is required in order for us to get the information we need. The original version of SERVQUAL by Parasuraman *et al*. (1985; 1988; 1994) showed the growing evidence that this instrument is suitable for most service organisations, since it shares various commonalities in the service delivery process both within and across industries. The instrument has even also been used in institutions of education

As mentioned earlier, since many studies (Brady *et al.,* 2002; Hope & Muhlemann, 1997) have widely discussed the suitability of using SERVQUAL and SERVPERF in different contexts, we had to analyse both to ensure we chose the right items. Therefore, modification was done to the initial version of the SERVQUAL questionnaire by Parasuraman *et al.* (1985; 1988; 1994), and took into consideration the 'performance side' of the actual process change impact on the processes in the selected case studies based on SERVPERF (Braday *et al*., 2002; Cronin & Taylor, 1992) and took into consideration the 'performance

side' of the actual process change impact on the processes in the selected case studies based on SERVPERF (Brady *et al*., 2002; Cronin & Taylor, 1992). SERVQUAL setting of the service organisation is dependent on specific research needs (Parasuraman *et al*., 1988), therefore this study tried to find a way to ensure the instrument was relevant and could measure accurately the actual research intentions to meet the research objectives. Prior to actual survey carried out, the pilot study was done to ensure the reliability of the questionnaire.

There are five dimensions of service quality that are perceived applicable in this context as stated in the SERVQUAL literature. These dimensions included Reliability, Responsiveness, Assurance, Empathy, and Tangibles. The details of the items for each dimension are listed in Table 5:

Table 5
Questionnaire Items

Part A Dimensions / items
Reliability:
1. The reliability, consistency, and dependability of the employees were….
2. The ability of the employees to provide service as promised was….
3. The sincerity of the employees in solving the problem was….
4. The ability of the employees in performing service right the first time was….
5. The ability of the employees in providing service at the promised time was….
6. The ability of the employees in maintaining error-free records was….
Responsiveness:
7. The willingness and ability of the employees to provide services in a timely manner were….
8. The ability of keeping customers informed about when services will be performed was….
9. The ability of providing prompt service to customers by the employees was….
10. The willingness of the employees to help customers was….
11. The readiness of the employees to respond to customer requests was….
Assurance:
12. The competence (knowledge and skill) of the employees was….
13. The approachability and ease of contact of the employees were….
14. The levels of courtesy, politeness, and respect I received were….
15. The way employees listened to me and spoke in a language that I could understand were….
16. The way employees instilled confidence in me was….
17. The way of interaction with employees so that I felt comfortable was….

18. The trustworthiness, believability, and honesty of the employees were….
19. The environment for care in terms of being free from danger, risk or doubt was….

Empathy:
20. The effort of the employees to understand my needs was….
21. The way employees gave individual attention to me was….
22. The way employees had the customer's best interest at heart was….
23. The convenience of business hours was….

Tangibles:
24. The neatness and cleanliness of the facilities and staff were….
25. The up-to-date equipment provided was….
26. The visually appealing facilities were….

Part B Dimensions / items

Reliability:
27. Generally, the employees provide service reliably, consistently, and dependably.
28. Generally, the employees provide service as promised.
29. Generally, the employees are sincere in solving the problem.
30. Generally, the employees perform service right the first time.
31. Generally, the employees provide service at the promised time.
32. Generally, the employees maintain error-free records.

Responsiveness:
33. Generally, the employees are willing and able to provide service in a timely manner.
34. Generally, the employees keep customers informed about when services will be performed.
35. Generally, the employees provide prompt service to customers.
36. Generally, the employees are willing to help customers.
37. Generally, the employees are always ready to respond to customer requests.

Assurance:
38. Generally, the employees are competent (i.e. knowledgeable and skilful).
39. Generally, the employees are approachable and easy to contact.
40. Generally, the employees are courteous, polite, and respectful.
41. Generally, the employees listen to me and speak in a language that I can understand.
42. Generally, the employees instil confidence in me.
43. Generally, the employees make me feel comfortable to interact with them.
44. Generally, the employees are trustworthy, believable, and honest.
45. Generally, this facility provides an environment that is free from danger.

Empathy:
46. Generally, the employees make the effort to understand my needs.
47. Generally, the employees give individual attention to me.
48. Generally, the employees have myself best interest at heart.
49. Generally, the business hours are convenient to me.

Tangibles:
50. Generally, the physical facilities and employees are neat and clean.
51. Generally, up-to-date equipment is provided.
52. Generally, the facilities are visually appealing.

As stated in Table 5, Part A consisted of the items that reflected the assessment of the service provided to respondents compared to their expectations, namely 'disconfirmation' or 'satisfaction'. This section used a Likert scale ranging from 1 to 7 (from 'worse than I expected', 'about what I expected', to 'better than I expected'). In addition, Part B listed items that best reflect the performance of the service perceived by the respondents, namely the 'service quality measure'. The respondents were asked to give their level of agreement by marking on the Likert scale 1 to 7 (very low, medium, very high).

Quantitative Data Analysis

Quantitative data were analysed using Statistical Packages for Social Sciences (SPSS) software. The first part of the analysis included descriptive statistics, in terms of frequency, percentage, and mean for preliminary survey. After that, a factor analysis followed for the constructs or dimensions in SERVQUAL. Then came descriptive analysis specifically for respondents' profiles and the score in each of the SERVQUAL dimensions. This was followed by the analysis of differences using T-test and ANOVA. This quantitative analysis was aimed at establishing the level of process performance perceived by students of HEIs, which was reflected by their level of satisfaction and measurement of overall service quality.

 The quantitative analysis of the student evaluation questionnaires was to answer how satisfied they were with the processes delivered to them. Hence, the analysis was more meaningful with ANOVA and correlation analysis. The use of these types of analysis were based on many research methods books, such as Hair, Anderson, Tatham and Black (1998), Sekaran (2000), Zikmund (1991) and also Vavra (1997) who suggested appropriate statistical methods for SERVQUAL measurement.

RESEARCH RESULTS

SERVQUAL Mean Scores

The satisfaction of the customers (students) with the service provided to them had a mean score of 4.65, and the service quality measured by them had a mean score of 4.76. Table 6 shows the results on these, with a maximum possible a mean score of 7.00.

Table 6
Mean Scores for Satisfaction and Service Quality in HEI-A

Dimension/ Score	Satisfaction		Service Quality	
	Mean	Std. Deviation	Mean	Std. Deviation
Reliability	4.56	0.7015	4.64	0.8697
Responsiveness	4.69	0.8247	4.76	0.8702
Assurance	4.82	0.8536	4.91	0.8496
Empathy	4.53	0.9873	4.61	0.9663
Tangibles	4.49	0.9934	4.76	1.7689
Overall	*4.65*	*0.7271*	*4.76*	*0.8097*

In terms of satisfaction, the respondents rated the highest score for the Assurance dimension, with a mean score of 4.82, followed by Responsiveness (4.69). After that, the dimension of Reliability showed a mean score of 4.56, Empathy was 4.53, and Tangibles was 4.49. It was found that there is a slightly higher score on each dimension for service quality measured, except for Empathy which had the lowest score in this part. Specifically, the score for Assurance was 4.91, Responsiveness 4.76, Reliability 4.64, Tangibles 4.76, and then Empathy 4.61. A total mean score for overall satisfaction was 4.65, slightly less than the overall service quality measured, which was 4.76.

Differences in Perception Among Groups

Analysis of Variance (ANOVA) was conducted to find out the difference in the mean of more than two groups, as suggested by Hair *et al.* (1998). In addition, the T-test was done for gender since only two groups were found in this case study. This study was based on the 95% confidence level, shown in Table 7.

The perception across the various respondents' programmes was significantly different for both satisfaction and service quality measured. The results showed that there were significant differences (0.000) in the perceptions of respondents in different programmes regarding their satisfaction on all of the dimensions in SERVQUAL

(Reliability, Responsiveness, Assurance, Empathy, and Tangibles). Similarly, the same results were obtained for the service quality measured. Results for each dimension measured also showed significant results. However, there were no significant differences in gender regarding all the SERVQUAL satisfaction dimensions. There were four results which were significant for gender regarding the service quality measured, which were 0.018 for overall service quality, Reliability (0.06), Assurance (0.037) and 0.018 for the Tangible dimension.

Table 7
Differences in Perception Among Groups in HE

Dimensions / profiles	Programme	Gender	Marital status	Race	Religion
Overall satisfaction/ disconfirmation (Part A):					
Sig. (2-tailed)	*0.000	0.209	*0.012	0.864	0.231
F Value	7.105	0.047	4.534	0.147	1.413
Overall service quality/ performance(Part B):					
Sig. (2-tailed)	*0.000	*0.018	0.371	0.676	0.315
F Value	6.930	1.697	0.996	0.392	1.194
Reliability:					
Part A- Sig. (2-tailed)	*0.000	0.491	0.193	0.762	0.180
F Value	7.105	0.539	1.660	0.273	1.585
Part B- Sig. (2-tailed)	*0.000	*0.006	0.621	0.915	0.206
F Value	5.207	0.917	0.478	0.088	1.494
Responsiveness:					
Part A- Sig. (2-tailed)	*0.000	0.181	*0.020	0.242	0.975
F Value	5.882	0.064	4.018	1.428	0.120
Part B- Sig. (2-tailed)	*0.000	0.072	0.723	0.619	0.124
F Value	5.413	0.124	0.325	0.481	1.833
Assurance:					
Part A- Sig. (2-tailed)	*0.000	0.292	*0.022	0.986	*0.053
F Value	4.572	0.583	3.891	0.014	2.386
Part B- Sig. (2-tailed)	*0.000	*0.037	0.591	0.704	*0.020
F Value	5.153	8.530	0.528	0.352	2.990
Empathy:					
Part A- Sig. (2-tailed)	*0.000	0.338	0.145	0.134	*0.006
F Value	5.387	0.040	1.949	2.032	3.727
Part B- Sig. (2-tailed)	*0.000	0.927	0.104	*0.031	*0.021
F Value	9.029	0.977	2.291	3.540	2.951
Tangibles:					
Part A- Sig. (2-tailed)	*0.000	0.165	*0.001	0.444	0.163
F Value	10.254	0.639	7.131	0.815	1.653
Part B- Sig. (2-tailed)	*0.007	*0.018	0.491	*0.007	0.975
F Value	2.880	0.636	0.714	5.164	0.120

*Significant at 0.05 or 95% confidence level

In the satisfaction dimensions, four results showed significant differences for the respondents' marital status, with 0.012 for overall satisfaction, 0.020 for Responsiveness, 0.022 for Assurance, and 0.001 for Tangibles. Otherwise, there were no significant differences in marital status regarding the service quality measured. In addition, the respondents' race showed significance differences of 0.031 regarding Empathy, and 0.007 regarding Tangible dimensions in service quality measured, but no significance in other dimensions, and all the dimensions in their satisfaction. Religion produces a different perception regarding Reliability in the satisfaction and service quality dimensions, which were 0.053 and 0.020, respectively. The different perceptions for religion regarding the Empathy dimension, in both satisfaction and service quality measured, were 0.006 and 0.021. Details of the results are given in Tables 8 (a) and (b) which show differences of mean score.

Table 8 (a)
Mean Score of Satisfaction Results in HEI-A

		Satis	ARel	ARes	AAss	AEmp	ATan
Programme	HND in Electrical Engineering	4.40	4.28	4.47	4.66	4.21	4.05
	Pre-HND	5.04	4.80	4.97	5.22	5.19	4.90
	HND in Electronic Engineering	5.00	4.98	5.00	5.27	4.82	4.60
	HND in Engineering and Business Information Technology	4.40	4.46	4.47	4.53	4.11	4.16
	HND in Medical Electronic Engineering	5.08	5.18	5.35	5.17	5.10	4.14
	HND in Engineering and Computing	4.24	4.31	4.45	4.37	3.78	3.93
	HND in Telecommunication	4.47	4.34	4.49	4.57	4.26	4.70
Gender	Male	4.73	4.61	4.79	4.90	4.61	4.59
	Female	4.60	4.54	4.63	4.77	4.47	4.38
Marital Status	Single	4.62	4.55	4.66	4.78	4.50	4.42
	Married	5.32	4.86	5.46	5.57	5.07	5.67
	Other	5.12	4.97	5.10	5.27	5.04	5.17
Race	Malay	4.65	4.58	4.66	4.82	4.55	4.44
	Chinese	4.59	4.28	5.33	4.81	3.42	4.89
	Other	4.71	4.58	4.80	4.84	4.58	4.61
Religion	Muslim	4.70	4.61	4.72	4.86	4.64	4.46
	Christian	4.46	4.42	4.66	4.54	4.09	4.47
	Buddhist	5.10	4.31	4.90	5.56	5.33	5.44
	Hindu	4.64	5.06	4.67	4.80	4.00	4.22
	Other	4.92	5.50	4.60	4.75	4.50	5.33

Key: Satis= satisfaction, ARel= reliability, ARes= responsiveness, AAss= assurance, AEmp= empathy, ATan= Tangible

Table 8 (b)
Mean Score of Service Quality Results in HE

		Serv	BRel	BRes	BAss	BEmp	BTan
Programme	HND in Electrical Engineering	4.35	4.50	4.43	4.41	4.12	4.05
	Pre-HND	5.20	5.02	5.10	5.21	5.26	5.58
	HND in Electronic Engineering	4.97	5.04	5.07	5.14	4.84	4.40
	HND in Engineering and Business Information Technology	4.55	4.26	4.54	4.86	4.34	4.56
	HND in Medical Electronic Engineering	5.21	5.13	5.48	5.48	4.98	4.53
	HND in Engineering and Computing	4.24	4.18	4.26	4.44	3.94	4.17
	HND in Telecommunication	4.61	4.45	4.60	4.86	4.34	4.68
Gender	Male	5.08	5.50	4.60	5.25	4.50	5.33
	Female	4.61	4.45	4.65	4.77	4.60	4.46
Marital Status	Single	4.74	4.64	4.75	4.90	4.57	4.72
	Married	5.06	4.81	4.99	5.18	5.07	5.38
	Other	5.08	4.94	4.90	5.13	5.25	5.28
Race	Malay	4.74	4.67	4.80	4.90	4.65	4.50
	Chinese	4.53	4.50	5.00	4.78	3.17	5.00
	Other	4.84	4.63	4.68	5.00	4.59	5.40
Religion	Muslim	4.81	4.72	4.84	4.94	4.71	4.73
	Christian	4.54	4.46	4.45	4.68	4.20	4.92
	Buddhist	5.12	4.14	5.13	5.90	5.25	4.78
	Hindu	4.67	4.50	4.70	5.08	4.17	4.56
	Other	5.08	5.50	4.60	5.25	4.50	5.33

Key: Serv= service quality, BRel= reliability, BRes= responsiveness, BAss= assurance, BEmp= empathy, BTan= Tangible

The following significant and important findings on satisfaction and quality are noted:
- HND in Medical Electronic Engineering students rated the overall satisfaction with the service provided to them (mean=5.08) higher than that for other students, with the differences being highly significant (0.000). Additionally, these students rated the Responsiveness dimension the highest (mean=5.35) compared to the other dimensions.
- Married students scored the highest in their overall satisfaction with service provided (mean=5.32) in comparison to the single (mean=4.62) and other marital status (mean=5.12), and the differences were statistically significant (0.012). Married students rated the Tangibles dimension (mean=5.67) the highest compared to the other dimensions.
- HND in Medical Electronic Engineering students perceived greater quality in the service provided to them (mean=5.21) compared to other students, with the differences being highly significant (0.000). Additionally, these students rated the Responsiveness and Assurance dimensions the highest (mean=5.48, respectively) compared to the other dimensions.
- Male students scored the highest in their perceived overall service quality (mean=5.08), higher than the female students (mean=4.61), with the observed

difference being statistically significant (0.054). Male students rated the Reliability dimension the highest (mean=5.50) compared to the other dimensions.

DISCUSSIONS AND CONCLUSIONS

The study confirms the previous research that has shown that radical process change can have a significant impact on satisfaction and service quality (Newman, 1997; Walker & Blcak, 2000; Khong & Richardson, 2003; Daly, 2004). The previous studies agree that in some circumstances there might occur some differences in satisfaction and service quality perceived by customers, mainly due to their background and past experiences. The study used the items for the process performance measurement, specifically foresees that in HEIs, reengineering can have a dramatic impact on student satisfaction and quality of service provided. The empirical survey which highlights the results from the students' evaluation questionnaires on their perception of satisfaction and service quality, seems favourable. This is in line with other researchers for example, Alavi and Yoo (1995), and Ascari *et al.* (1995), who stated that with proper changes implementation, the implementation of process change will be successful and can be measured using other methods which are suitable for its purpose. Several examples regarding the successful implementation of BPR include teaching performance, course and programme design (Fulton & Ellwood, 1989), curriculum change (Ruth, 1998) and research activities (Johnson *et al.*, 1995). Other than the academic function, other non-academic issues, include community relationship, budget planning, staff development and student enrolment process (Johnson *et al.*, 1995). The reasons for these BPR initiatives are the increasing expenditure in the total administrative costs due to expanded enterprise and the loss of nearly 20% of the support in the school's general funds. After having gone through the BPR processes, including the development of the school's process map, focused on a high-level process-based mission, customer-focus, and administrative fragmentation (i.e. identification of division or department), etc., this resulted in the new organisational set up, particularly a new structure of the administrative organisation. This experience proved that it is actually possible for HEIs to achieve the results promised by reengineering.

To sum up, as we pointed out that when students' expectations are met or exceeded, they would be delighted and satisfied. We realise the importance of measuring the satisfaction and service quality of the key processes in order to evaluate the successful reengineered process.

Research in this direction could go a long way towards developing a metric for measuring satisfaction and service quality level in HEIs. Therefore, we conclude that BPR is considered a feasible management technique that can improve the service quality management and business performance in HEIs.

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