E-Business as a Tool for Managing the Value Chain of Educational Institutions: A Case Study of Ho Polytechnic in Ghana

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Abstract

This article is an investigation of the application of e-business to the value chain of Ho Polytechnic and an assessment of efforts being made by the institution to use e-business as a tool for managing the value chain activities of the institution. The article reviews available literature on value chain and e-business, and assesses the challenges and constraints facing Ho Polytechnic in the bid to apply e-business to its value chain activities as a strategy for reducing cost, improving efficiency and maximising productivity. Questionnaires were administered among 100 management and academic staff to find answers to the research questions. Key management staff were interviewed about the ICT agenda of the Polytechnic. A major finding of the research is that Ho Polytechnic continues to undertake the bulk of its value chain activities manually. Unreliable Internet connectivity has frustrated attempts to apply e-business. To confront these constraints, the Polytechnic has crafted an ICT Policy; contracted SocketWorks Global to re-engineer, automate and upgrade its value chain operations and to train staff in the use of the automated and re-engineered facilities. The study recommends the application of e-business as a tool for managing the value chain activities of Ho Polytechnic, but calls for a review of the contract with SocketWorks Global if the application of e-business is to succeed in achieving the desired impact.

Key words: E-Business, institutional challenges, value chain management.

Introduction

In 2003, Ghana launched an Information Communication and Technology (ICT) Policy for Accelerated Development (ICT4AD Policy). The Policy seeks to address the development challenges of Ghana and accelerate her socio-economic development process through the development, deployment and exploitation of ICT (Ministry of Communication, Republic of Ghana, 2003). The specific objectives were to:

- Facilitate the deployment, utilisation and exploitation of ICT within the educational system to improve on educational access and delivery and to support teaching and learning from primary school and beyond.
- Modernise the educational system to improve the quality of education and training at all levels of the educational system and expanding access to educational, training and research resources and facilities,
- Orientate all levels of the country's educational system to the teaching and learning of science and technology in order to accelerate the spread of science and technology in society and produce a critical mass of requisite human resource and a well informed citizenry,
- Achieve universal basic education and improve the level of basic computer literacy in the country,
- Ensure that all citizens are at least functionally literate and productive,
- Expand and increase access to secondary and tertiary education, and
- Strengthen science education at all levels in all aspects of the educational system (Ministry of Communication, Republic of Ghana, 2003).

E-business is the conduct of business on the Internet. E-business depends on the use of web to carry out business transactions like; advertising, promotion of products, sending and receiving of purchase requests, invoices, inventory control, billing of retailers and electronic payments. E-business is a paperless transaction, meant to save cost and put organisations at competitive advantage (Burn, 2007). Heavy expenditure is incurred by most organisations on the creation, handling and storage of paper documents like proposals, purchase orders, shipping documents, invoices, payment approvals and cheques. The advantage of applying e-business to educational programmes to reduce cost, improve efficiency and maximise productivity, is the subject matter of investigation in this research.

Statement of the Problem

Most transactions in the value chain activities of Ho Polytechnic, like the advertisement of programmes, sale of

admission forms, issuing of admission letters to students, billing of students, payment of fees, registration of programmes and staff performance appraisal, are manually done at great cost to institution. These manual transactions are labour intensive, time consuming, stressful, and very expensive and involve the use of much paper. This situation has been aggravated by the following challenges and constraints;

- increasing number of qualified applicants the Polytechnic has had to admit,
- dwindling government subvention to polytechnics in Ghana over the years,
- rising cost of education delivery using traditional methods;
- inadequate academic and physical facilities
- low morale among staff as a result of poor conditions of service (Ho Polytechnic 2002).

The application of e-business to the activities in the value chain of the Polytechnic is expected to help reduce cost, improve efficiency and maximise productivity of education delivery. The core businesses of the Polytechnic are teaching and learning, research and community service. Teaching and learning as core activities involve, registration of students, teaching, practical training and industrial attachment, setting of examinations, moderation of question papers, conduct of examinations, assessments of students and grading, as well as consideration and publication of results. At the moment, most of these activities are carried out manually, without a resort to e-business or the use of the Internet.

The supporting activities like advertising of programmes, issuing of identification cards to students, matriculation and congregation, billing of students and arrangements for the collection of monies, orientation of students on the use of the library, maintenance of institutional physical and academic facilities, orientation of students on the rules and regulations of the institution are also manually accomplished.

Research Questions

The main research question is 'Can e-business be applied to the activities in the value chain of the Polytechnic to help reduce cost, improve efficiency and maximise productivity?

The research questions of this study are therefore:

- What are the challenges and constraints facing the Polytechnic in performing its value chain activities in the education delivery process?
- What efforts are being made to address these challenges and constraints?
- Can e-business be applied to the value chain activities of educational programmes at Ho Polytechnic to reduce cost, improve efficiency and maximise productivity?

Objectives of the Study

The general objective of the study is to assess the prospects of applying e-business to the core activities of Ho Polytechnic in order to help the institution reduce cost, improve efficiency and maximise productivity in the management and delivery of educational programmes.

The specific objectives of the study are:

- To examine the challenges and constraints facing Ho Polytechnic in performing its value chain activities manually.
- To assess efforts being made to address the challenges and constraints.
- To assess the possibility and benefits of applying e-business to the value chain activities of Ho Polytechnic.
- To make relevant recommendations to the Polytechnic on the application of e-business to the value chain activities.

Methodology of the Study

Ho Polytechnic is the study area of the research. The Polytechnic has total staff strength of about 300. In order to ensure that the research findings have a strong internal validity a sample of 100 respondents was drawn from total staff strength of 300. The sample size represents 33.33% of the total population of staff. The study adopted quota and purposive sampling to select staff for interviewing and administering of questionnaire. Key management staff were interviewed on ICT policy vision and challenges confronting the institution. Statistical Package for Social Sciences (SPSS) was used to codify, classify and analyse data collected from the field.

Literature Review

The Concept of Value Chain and Value Chain Analysis

This review concentrates on the concepts of value chain analysis and e-business. It defines the two concepts, traces their origin, development and application of e-business to educational programmes and discusses the benefits of the application of e-business to the value chain activities of educational programmes. The value chain analysis in the opinion of Porter (1985) and Shank & Govindarajan (1993) is the breaking down of

business functions or production processes into separate and strategically relevant activities for purposes of understanding the behaviour of cost and the sources of differentiation of these activities. For example, human resource could be divided into recruitment, training, development, compensation and personnel. The value chain is a series of interdependent and interconnected activities in the process of production of value.

According to Kaplan & Norton (1992) general value chain of any organisation may be described in terms of three main elements- its primary activities, its support activities and the margin or the profit it makes. Value chain analysis Kaplan & Norton (1992) state, is used to identify potential sources of economic advantage. Kaplan & Norton (1992) point out that value chain analysis determines how the firm's own value chain interacts with the value chains of suppliers, customers and competitors. Companies, they noted, gain competitive advantage by performing some or all of these activities at lower cost or with greater differentiation than their competitors.

Primary activities, Porter (1985) notes, are responsible for the creation of the product, its sale and transfer to buyers and the offer of after-sales service. Porter (1985) lists primary activities as; inbound logistics, operations, outbound logistics, marketing and sales and service. Inbound logistics in the opinion of Porter (1985) include, warehousing, materials handling and inventory control. Operations on the other hand, comprise the activities that change inputs into finished products like machining, testing, packaging and the maintenance of equipment. Outbound logistics are the activities that store and distribute products to buyers, e.g., warehousing, delivery fleet operations and order processing. Marketing and sales as indicated by Kaplan & Norton (1992) are the activities that provide the means for the buyer to purchase, e.g., advertising, sales force operations, selection and management of distribution channels.

Support activities in value chain analysis, as stated by Kaplan & Norton (1992) are the activities that support the primary activities and each other. Three of these activities, Kaplan & Norton (1992) point out, are procurement, technology development and human resource management. These support activities can be associated with specific primary activities, while the fourth, business infrastructure, supports the entire chain. Support activities comprise procurement of raw materials. Procurement is usually concentrated in a purchasing department; other purchasing activities are often dispersed throughout a firm (Kaplan & Norton 1992).

The costs and value drivers are identified for each value activity. The value chain framework quickly made its way to the forefront of management thought as a powerful analysis tool for strategic planning. Its ultimate goal is to maximize value creation while minimizing costs. The concept has been extended beyond individual organizations. It can apply to whole supply chains and distribution networks. The delivery of a mix of products and services to the end customer, will mobilize different economic factors, each managing its own value chain (Olhager et al, 2006).

To perform value chain analysis, a firm is divided into its key activities and costs assigned to those activities. For each activity, there is the need to understand the cost drivers, the linkages between activities and the company's cost position relative to other competitors. Linkages to the buyers' and suppliers' value chain are identified and potential sources of differentiation assessed. A differentiation strategy is developed to maximise value to the buyer and minimise an increase in cost to the producer of the product or service (Burn, 2007).

The Concept of E-Business
Electronic Business, commonly referred to as *e-Business* may be defined as the utilisation of information and communication technologies (ICT) in support of all activities of business. Commerce constitutes the exchange of products and services between businesses, groups and individuals and is one of the essential activities of any business. 'Hence, electronic commerce or e-Commerce focuses on the use of ICT to enable the external activities and relationships of the business with individuals, groups and other businesses' (Sébastien, 2006).

The emergence of e-business is redefining the way business is conducted. It offers organisations new ways to expand the markets, in which they compete, streamlines their corporate business processes to deliver products and services more efficiently, attracts and retains customers in new and innovative ways and reduces costs of operations. E-business is transforming the way customers, employees and suppliers are relating to one another. These changes are forcing organisations to craft new strategies and adopt new methods of implementing e-business strategies (Baghdadi, 2006).

E-business can be described as an emerging area that encompasses processes directly and indirectly related to the buying, selling and trading of products and services and information electronically. Baghdadi (2006) defines e-business based on four perspectives. These four perspectives are:

- *communication perspective* – e-business is the deliverer of information, products/services or payments over telephone lines, computer networks, or any other electronic means;
- *business process perspective* – e-business is the application of technology towards the automation of business transactions and work flows;
- *service perspective*– e-business is a tool that addresses the desire of firms, consumers, and management to cut service costs while improving the quality of goods and increasing the speed of service delivery; and
- *online perspective* – e-business provides the capacity to buy and sell products and information on the Internet as well as other online services.

E-business involves the buying and selling of information, products, and services e-business and business use of the Internet. It involves all aspects of trading including commercial market creation, ordering, and the transfer of money. Businesses have shown significant interest in using the Internet as a means for building stronger relationships with customers, suppliers, employees and business partners (Baghdadi, 2006).

E-business provides manufacturers with a great opportunity to sell and distribute directly to final customers. E-business also improves the flow of organisational information. It is especially useful in gathering intelligence on customers, competitors, and potential markets. E-business increases an organisation's ability to sense and respond to the market needs by collecting and disseminating market information throughout the organisation. With this information, the organisation could accurately assess or stimulate market demand and search for new markets (Ariguzo et al, 2006).

The electronic medium associated with e-business has the potential of increasing the speed in service delivery and communication. E-business enables organisations to shorten procurement cycles, reduce development cycles, and accelerate time to market through collaborative engineering, product and process design. This dramatically reduces purchasing, production, and cycle time. E-business allows organisations to quickly respond to customer needs through reduction of the time to market, the time to produce and the time to deliver. 'The opportunities afforded by an internet-based e-marketplace significantly improve the productivity and competitiveness of participating e-business-based organisations'. (Ariguzo et al, 2006).

Getting Strategic Advantage in a Competitive e-Business Environment

An important way of getting strategic advantage in a competitive business environment, Kaplan & Norton (1992) note, is through leveraging the organisation through ICT and e-business. E-business, they contended, is fundamental to business strategy and process execution. Typically an organisation will look to ICT to enhance selling or buying channels. Those that engage primarily in business to customer (B2C) commerce give priority to their sell side to generate increased revenue better manage customer relationships and reduce costs. This is especially true of the dot-com companies that typically have negligible supply chains and that are driven by a need to gain market shares rapidly. Companies that engage primarily in business to business (B2B) commerce tend to give priority to reducing the costs of selling, buying, or both in the opinion of Kaplan & Norton (1992).

Designing a Website: Steps and Purpose

Pister (1999) prescribes five easy steps to be taken in the design of a website. In his opinion, there is a compelling need to;

- get a domain name,
- find a web host,
- get website software,
- design a web page and upload a web page or use a website host template as part of the hosting package.

Benefits Associated with the Adoption of E-Business

In making the case for e-business the real and potential competitive advantages in terms of cost reduction, maximization of productivity and the improvement of efficiency are paramount. The following are the real and potential benefits associated with the deployment and exploitation of an e-business in the value chain of an organisation;

- ability to introduce your organisation and staff to the wider world by displaying resumes and pictures on the world wide web,
- strengthening relationships and the ability to market additional services to existing clients,
- availability of information twenty-four hours per day at minimum cost and with minimum resources,
- interactive communications with clients,

- strengthening of recruitment processes,
- reduction in the cost of paper,
- elimination of private network charges,
- process efficiency through work flow redesign,
- outsourcing of functions and linkages to customers and suppliers through collaborative extranets,
- reduction in the cost of customer service, phone and fax,
- reduction in inventory, procurement and training costs to the organisation (Burn 2007).

The benefits of e-business as a result of the use of the Internet, intranets and extranets may be classified under five headings: enhanced communication, productivity enhancements, business enhancements, and cost reduction and information delivery. In doing a strategic analysis for e-business solutions, technology leadership is imperative for achievement of results. Plant (2000) identifies seven dimensions of an e-business strategy: three bonding factors—leadership, infrastructure and organisational learning and four positional factors, technology, branding, service and market. He also notes the keys to successful development of e-business strategies as;

- developing a strategy before developing a web presence,
- developing a strategy by focusing on technology, branding, service and market,
- developing an IT infrastructure capable of matching the strategic objectives,
- identifying and using knowledge in the organisation,
- focusing on added value for customers,
- continually evolving these strategies and having a senior executive as project champion (Plant 2000).

Ho Polytechnic ICT Policy

Ho Polytechnic, in an effort to confront the challenges and constraints facing it, has embarked upon a series of measures to upgrade its ICT status. These measures include the crafting of an ICT Policy to guide its ICT agenda; an arrangement for staff to procure 150 personal laptop computers; the training of staff in the application of e-business to the value chain activities of the institution and the entry into an agreement with SocketWorks Global, an ICT service provider, to provide state-of-the-art ICT services to the Polytechnic in line with its ICT Policy (Ho Polytechnic Draft ICT Policy 2008).

The Draft ICT Policy has a *Vision* to make the Polytechnic a centre of excellence for exploiting ICT potentials in the teaching, learning, research and administrative activities. It has a *Mission* of using ICT to improve the effectiveness and efficiency of managing the academic and administrative value chain activities of the institution (Ho Polytechnic Draft ICT Policy 2008).

The goals of the Draft ICT Policy are stated below:

- To establish an efficient and cost-effective infrastructure for providing equitable access to local, national and international networks.
- To setup a management team with oversight responsibility for the development, deployment, maintenance and sustainability of ICT facilities and services.
- To develop an appropriate regulatory framework for ICT related issues
- To develop the requisite ICT manpower for the Polytechnic.
- To setup appropriate, reliable, secured, up-to-date and easily accessible Polytechnic databases.
- To motivate teaching, professional and technical staff to ensure the development of ICT by providing incentives and state-of-the-art equipment
- To provide an efficient protection for the ICT equipment and facilities.
- To promote widespread use of ICT applications for efficient teaching, learning, research and administration (Ho Polytechnic Draft ICT Policy 2008).

Presentation and Analysis of Data

The questions that this discussion seeks to address, as earlier stated in the statement of the problem, are as follows:

- What are the challenges and constraints facing the Polytechnic in performing its value chain activities in the education delivery process manually?
- What are the benefits of applying e-business to the value chain activities of the Polytechnic?
- What efforts are being made to address these challenges and constraints?
  - Can e-business be applied to the value chain activities of educational programmes at the Polytechnic?

Challenges and Constraints facing Ho Polytechnic
**in Performing its Value Chain Activities Manually**

Apart from the general challenges and constraints facing Ho Polytechnic like, inadequate funding, inadequate

infrastructure, poor conditions of service, strikes among staff and students and high staff turnover, the institution is confronted with specific challenges and constraints in relation to the application of e-business to the value chain activities of the Polytechnic. These challenges and constraints, according to (Dzisi 2009 & Aboagye 2009), are as follows:

- Unreliable Internet connectivity and very slow functionality of the Internet when it is eventually available
- Inappropriate design of the current Computer Laboratory of the Polytechnic
- Frequent break down of available computers and air-conditioners due to fluctuating and unreliable power supply from the national grid
- Lack of funds to readily repair the computers and air-conditioners when they break down
- Inadequate technical know-how and competence in computer application among staff
- Difficulty in getting specified accessories, parts and equipment due to failure to involve consumer departments in procurement process
- Limited number of polytechnic computers for staff and students at the Polytechnic to facilitate the deployment of a meaningful e-business venture.

Data collected from the field revealed that 79.8 % of respondents were either very literate or literate in computer skills. Nineteen point two percent (19.2 %) of respondents rated themselves as moderately literate in computer application.

LEVEL OF COMPUTER LITERACY
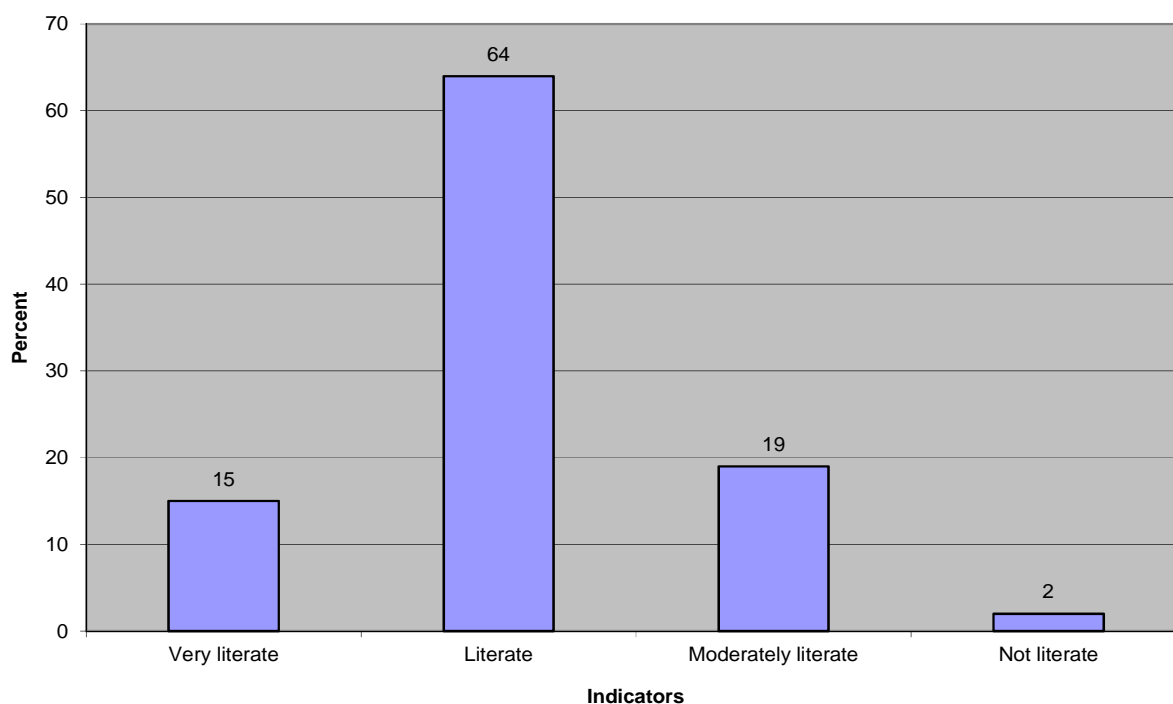
Eighty-eight point nine percent (88.9 %) of respondents either possessed computers at home or in their offices at the Polytechnic. Only 11.1 % of respondents did not possess computers at home or in their offices.

POSSESSION OF COMPUTER AT HOME OR OFFICE BY RESPONDENTS
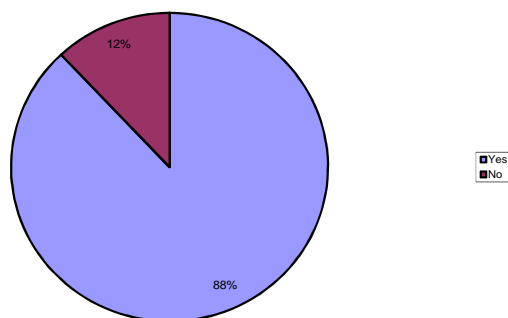
Table 3: Uses to which Computers were put by Respondents

No	Responses	Yes %	No %	Total %
1	Research Activities	72	28	100
2	Browsing the Internet	71	29	100
3	Lecture Notes	65	35	100
4	Power Point Presentation	34	66	100
5	Total	242	158	100

Sources: Field Data April 2009.

USES TO WHICH COMPUTER WERE PUT
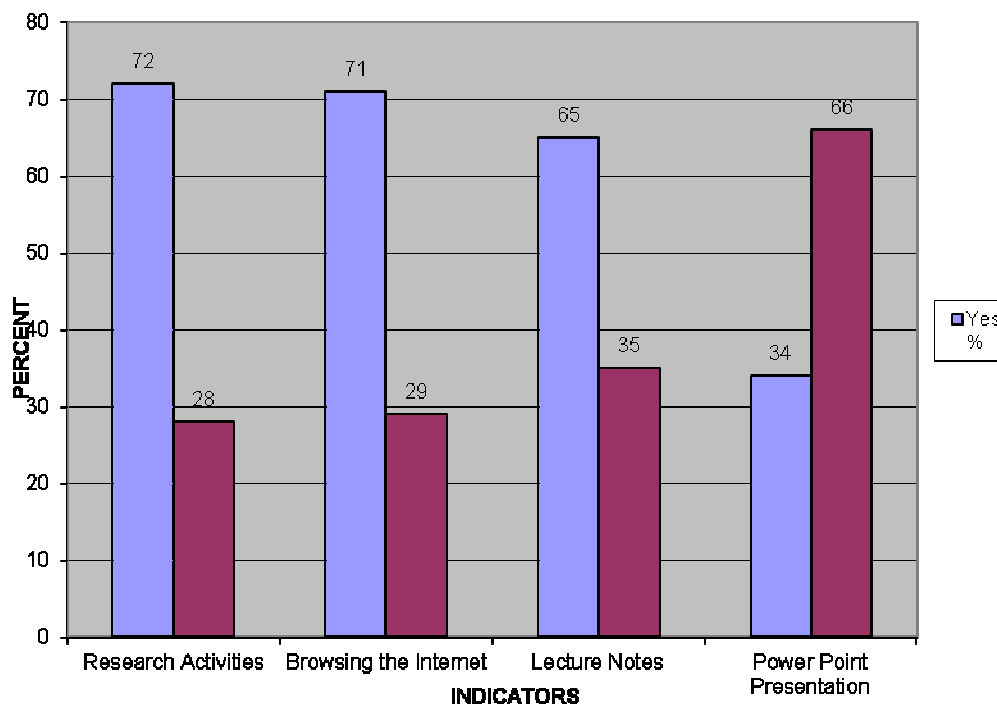
Seventy-two percent of the respondents used their computers for research activities, 71 % used it for browsing the Internet and 65 % used them for their lecture notes, whilst 34 % of the respondents used their computers for power point presentations.

Table 4 Networking of Computers in offices for sharing Information

Computers	Frequency	Percent
Yes	22	22.0
No	78	78.0
Total	100	100

Sources: Field Data, April 2009.

NETWORKING OF COMPUTERS IN OFFICES FOR SHARING INFORMATION
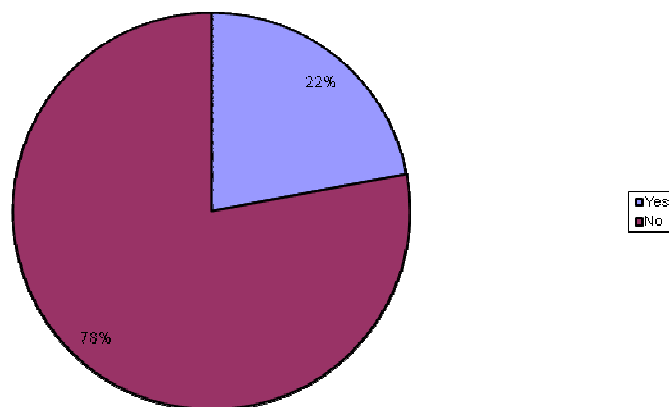
A major benefit of communication technology is the sharing of information to facilitate the achievement of organisational objectives. One way of maximising the opportunity for sharing information at the workplace is local area networking of available computers. Unfortunately, 79.6 % of the respondents who possessed computers at the Polytechnic did not have their computers locally networked to facilitate the sharing of information vital to the performance of their duties and responsibilities. Twenty point four percent of the networked computers were in the Department of Statistics and the Computer Centre of the Polytechnic. This means that with the exception of these two departments, opportunities for sharing information through locally networked computers did not exist at the Polytechnic at the time of this research.

Table 5: Communication with Students through the E-mail by Respondents

Com.	Frequency	Percent
Yes	23	23.0
No	77	77.0
Total	100	100.0

Sources: Field Data, April 2009.

A critical aspect of communication technology is the sharing of information through various means including the use of the e-mail, to help reduce cost, improve efficiency and maximise productivity in the management of educational programmes. In responding to questions on their correspondence with students through e-mail, 77.8 % of the respondents stated that they did not correspond with students through the e-mail.

Table 6: Issues Communicated to Students through E-mail by Respondents

Communicated	Frequency	Percent
Assignments	8	8.0
Lecture Notes	2	2.0
Rescheduling of Lectures	10	10.0
Regulations for Students	2	2.0
Non-response	78	78
Total	100	100

Sources: Field Data, April 2009.

Those respondents, who communicated with students through the use of the e-mail, stated that they communicated assignments (36.4 %), lecture notes (9.1 %), and 45.5 % for the rescheduling of lecture periods. The use of e-mail at the Polytechnic between staff and students was mainly for the rescheduling of lecture periods.

Table 7: Communication with Colleagues through e-mail by Respondents

Response	Frequency	Percent
Yes	60	60
No	40	40.0
Total	100	100.0

Sources: Field Data, April 2009.

With respect to the use of e-mail in communicating with colleagues, 59.6 % of the respondents used the e-mail whilst 40.4 % of them did not use the e-mail as a means of communication with their colleagues. For those who communicated with their colleagues through the use of the e-mail, 47.5 % of the issues were personal, POTAG or management issues constituted 22.0 %, issues concerning the conditions of service constituted 13.6 %, whilst issues of strategies for achieving the objectives of the Polytechnic amounted to 5.1 %.

Table 8: Issues Communicated to Colleagues through the E-mail

Communicated	Frequency	Percent
Personal issues	28	28.0
POTAG/mgt issues	13	13.0
Condition of service issues	8	8.0
Workload challenges	7	7.0
Strategies for achieving the Polytechnic objectives	3	3.0
Total	59	59.0

Sources: Field Data, April 2009.

On the rating of the competence of respondents on computer applications, 86 % of them rated their competence in word processing as excellent, very good and good, whilst 14 % of them considered their competence in word processing as either fair or poor. With respect to the competence of respondents in spreadsheet, 51.6 % of the respondents rated their competence as fair or poor. The rating for the use of Access among respondents was 60.5 % for those who were either fair or poor.

Table 9: Rating of Computer Applications among Respondents

Computer Application	Excellent %	Very Good %	Good %	Fair %	Poor %	Total %
Word Processing	10.0	32.0	44.0	10.0	4.0	100
Spreadsheet	6.3	15.8	26.6	30.5	21.1	100
Power Point Presentation	6.5	9.8	45.7	25.0	13.0	100
Access	3.3	8.8	27.5	37.4	23.1	100
Excel	11.5	17.7	47.9	14.6	8.3	100
Internet	14.6	31.2	37.5	6.2	10.4	100
SPSS	2.2	4.4	11.0	19.8	62.6	100

Source: Field Data, April 2009.

The use of Excel recorded 77.1 % of respondents rating their competence as excellent, very good and good, whilst 22.9 % rated themselves as either fair or poor in the use of Excel. Rating of respondents on Internet browsing skills, recorded 83.3 % as excellent, very good and good, thus making the rating of Internet browsing skills one of the greatest competencies of respondents. The rating of the competence of respondents on the use of SPSS computer application presented a different picture. Eighty-two point four rated their competence in the use of Statistical Package for Social Scientists (SPSS) as either poor or fair.

Another constraint facing the Polytechnic is the inadequate number of computers for staff and students for carrying out their teaching, learning and community service mandates through the application of e-business. For example, an institution of about 3,500 students and 350 staff has only 357 computers, 253 of which are located within the Computer Centre and 44 located with the management staff of the Polytechnic. Out of the 357 computers, 225 of them are connected to the Internet for teaching and learning purposes. Of the 225 connected to the Internet, 188 are located in the Computer Centre, whilst 12 are within the Department of Statistics.

Statistics revealed that apart from the 44 computers used by management staff, 25 of them are connected to the Internet. This makes the level of Internet connectivity, among management staff 56.82 %. The level of computer connectivity among the teaching staff, excluding the Computer Centre which has 253 computers, is 20 %.This is because there are 60 computers out of which only 12 are connected to the Internet. Interestingly, none of the computers, located within the offices of management staff, are linked through Local Area Network to facilitate the sharing of vital management information.

Table 10: Availability of Computers to Academic Staff

No	Academic Department	No. of Staff	No. of Computers	Ratio of Computers to Staff	No. Locally Networked	No. Connected to the Internet
1	Accountancy	14	4	1:3.5	Nil	Nil
2	Marketing	6	3	1:2	Nil	Nil
3	Secretaryship	7	2	1:3.5	Nil	Nil
4	Catering	15	4	1:3.8	Nil	Nil
5	Statistics	6	32	5.3:1	Nil	12
6	Fashion	11	2	1:5.5	Nil	Nil
7	Agric Engineering	14	2	1:7	Nil	Nil
8	Civil & Eng. B.Tech	14	2	1:7	Nil	Nil
9	Electrical Eng	7	2	1:3.5	Nil	Nil
10	Mechanical Eng	15	2	1:7.5	Nil	Nil
11	Liberal Studies	12	5	1:2.4	Nil	Nil
12	Computer Centre	7	253	36.2:1	Nil	188
13	**Total**	**128**	**313**	**1:2.1**	**Nil**	**200**

Source: Field Data April 2009.

For the purpose of computing the ratio of computers to staff, the 253 Computers at the Computer Centre were not used since there were meant Computer Literacy lectures for students rather than for staff use.

An important aspect of the use of e-business as a tool for managing the value chain of educational programmes is the availability and ratio of official computers to staff. With respect to the academic departments, the best ratios were found in the Computer Centre (36 computers to one person) and the Department of Statistics, where there were five computers to one person. The worst case ratios are found in the departments Agricultural Engineering and Civil Engineering and Building Technology, where there was one computer to seven people.

A further constraint facing the Polytechnic is the unreliable and very slow Internet connectivity at the Polytechnic. Respondents lamented how slow and unreliable the Internet service at the Polytechnic has been, which made browsing on the Internet for research, e-mail and other purposes, such a frustrating experience. To make a bad case worse, there has been frequent break down of the computers available at the Polytechnic due to fluctuating and unreliable power supply from the national grid (Aboagye, 2009).

Table 11: Availability of Computers to Non-Academic Staff

No	Non-Academic Department	No. of Staff	No. of Computers	Ratio of Computers to Staff	No. Locally Networked	No. Connected to the Internet
1	Rector	5	4	1:1.3	Nil	2
2	Vice Rector	2	2	1:1	Nil	1
3	Registrary	33	13	1:2.6	Nil	9
4	Finance Office	14	10	1:1.4	Nil	9
5	Internal Audit Office	3	2	1:1.5	Nil	2
6	Development Office	2	2	1:1	Nil	1
7	Estate Office	1	1	1:1	Nil	1
8	Library	13	5	1:2.6	Nil	Nil
9	Planning Office	1	2	2:1	Nil	Nil
10	Industrial Liaison	1	2	2:1	Nil	Nil
11	Polytechnic Hostels	9	Nil	0:9	Nil	Nil
12	Dean of Students	1	1	1:1	Nil	Nil
13	**Total**	**85**	**44**	**1:1.9**	**Nil**	**25**

Source: Field Data, April 2009.

There is inadequate availability of information technology know-how among the staff of the institution in some computer applications. In fact 62.6 % of respondents rated their competence in the application of SPSS as poor. With respect to competence in the application of Access, 60.5 % were either fair or poor. This is arguably a very big challenge for a technological institution in the 21st century.

The institution virtually accomplished all its value chain activities in the traditional manual manner. For example, 96.8 % of advertisements were manually executed, orientation for students 98.9 %, signing of the Matricula 99.0 %, billing of students 83.9 % whilst placement of students for Industrial Attachment was 97.9 % manually accomplished.

For the first time in the history of the Polytechnic, some students were given the opportunity to register their programmes through the Internet, during the second semester of 2008/2009 academic year. Indeed this innovation recorded 19.8 % Internet registration for programmes by students. It was however not possible for students to register outside the Polytechnic, because the necessary upgrading of format and orientation for students had not been done earlier (Dzineku 2009).

Table 12: Current Level of Performing Value Chain Activities

| No.	Activity	Manual	%	LAN	%	Internet	%
1	Advertisement of Programmes	90	96.8	3	3.2	Nil	0
2	Admission Forms	92	96.6	2	2.1	1	1.1
3	Students' Admission	91	94.8	3	3.1	2	2.1
4	Registration of Students	33	34.4	44	45.8	19	19.8
5	Orientation for Students	93	98.9	1	1.1	Nil	0
6	Signing of the Matricula	95	99	1	1.0	Nil	0
7	Billing of Students	78	83.9	12	12.9	3	3.2
8	Payment of School Fees	72	75.8	17	17.9	6	6.3
9	Assignment to Students	87	93.5	2	2.2	4	4.3
10	Industrial Attachment Placement	93	97.9	1	1.1	1	1.1
11	Performance Appraisal	88	94.6	4	4.3	1	1.1
12	Lecture Notes	90	95.7	3	3.2	1	1.1
13	Congregation Notices	94	96.9	2	2.1	1	1.0
14	Publications of Staff	83	91.2	6	6.6	2	2.2
15	Regulations for Students	92	96.8	3	3.2	Nil	0
16	Staff Orientation	92	98.9	1	1.1	Nil	0
17	Practical Training	88	95.7	2	2.2	2	2.2
18	Conditions of Service	94	97.9	2	2.1	Nil	0
19	Results of Students	86	88.7	9	9.3	2	2.1
20	Consultancy Services	87	93.5	6	6.5	Nil	0

Source: Field Data, April 2009.

The advertisement of programmes, orientation for students, signing of the Matricula, distribution of regulations for students, orientation for staff, distribution of conditions of service for staff and consultancy services by the Polytechnic, are yet to be put on the Internet for the benefit of staff, students and the general public. This means that the provision of these programmes and services could not be accessed electronically via the Internet during this study.

Commenting on the need to apply e-business to the value chain activities of the Polytechnic, various levels of e-business application were recommended. Respondents took this position because in their opinion, the existing challenges and constraints would not allow full-scale e-business application possible. They therefore proposed that the application of e-business should be done hand in hand with the Local Area Networking, until the availability of Internet connectivity was more reliable and power supply less fluctuating (Aboagye 2009). Respondents, for example, recommended that 61.1 % Internet sale of admission Forms, 54.9 % advertisement of programmes, 42.7 % for registration of students and 50 % consultancy services be put on the Internet.

Table 13: Position of Respondents on the Need to Apply E-Business to the Value Chain Activities

No.	Activity	LAN	%	Internet	%	LAN & Internet	%	Total %
1	Advert. of Programmes	12	13.2	50	54.9	29	31.9	100
2	Sale of Adm. Forms	10	10.5	58	61.1	27	28.4	100
3	Admission of Students	28	30.1	50	53.8	15	16.1	100
4	Registration of Students	42	43.8	41	42.7	13	13.5	100
5	Orientation for Students	61	74.4	20	24.4	1	1.2	100
6	Signing of the Matricula	69	81.2	14	16.5	2	2.4	100
7	Billing of Students	54	56.2	40	41.7	2	2.1	100
8	Payment of School Fees	54	59.3	37	40.7	Nil	0	100
9	Assignment to Students	53	59.6	32	36.0	4	4.5	100
10	Industrial Attachment	49	54.4	36	40	5	5.6	100
11	Performance Appraisal	71	78.8	17	18.8	2	2.2	100
12	Lecture Notes	60	65.9	27	29.7	4	4.4	100
13	Congregation Notices	25	26.9	41	44.1	27	29.0	100
14	Publications of Staff	42	46.2	44	48.4	5	5.5	100
15	Regulations for Students	54	62.8	27	31.4	5	5.8	100
16	Staff Orientation	63	75.9	18	21.7	2	2.4	100
17	Practical Trg Placement	54	60.0	34	37.8	2	2.2	100
18	Conditions of Service	66	72.5	23	25.3	2	2.2	100
19	Results of Students	59	60.8	38	39.2	Nil	0	100
20	Consultancy Services	39	44.3	44	50.0	5	5.7	100

Source: Field Data, April 2009.
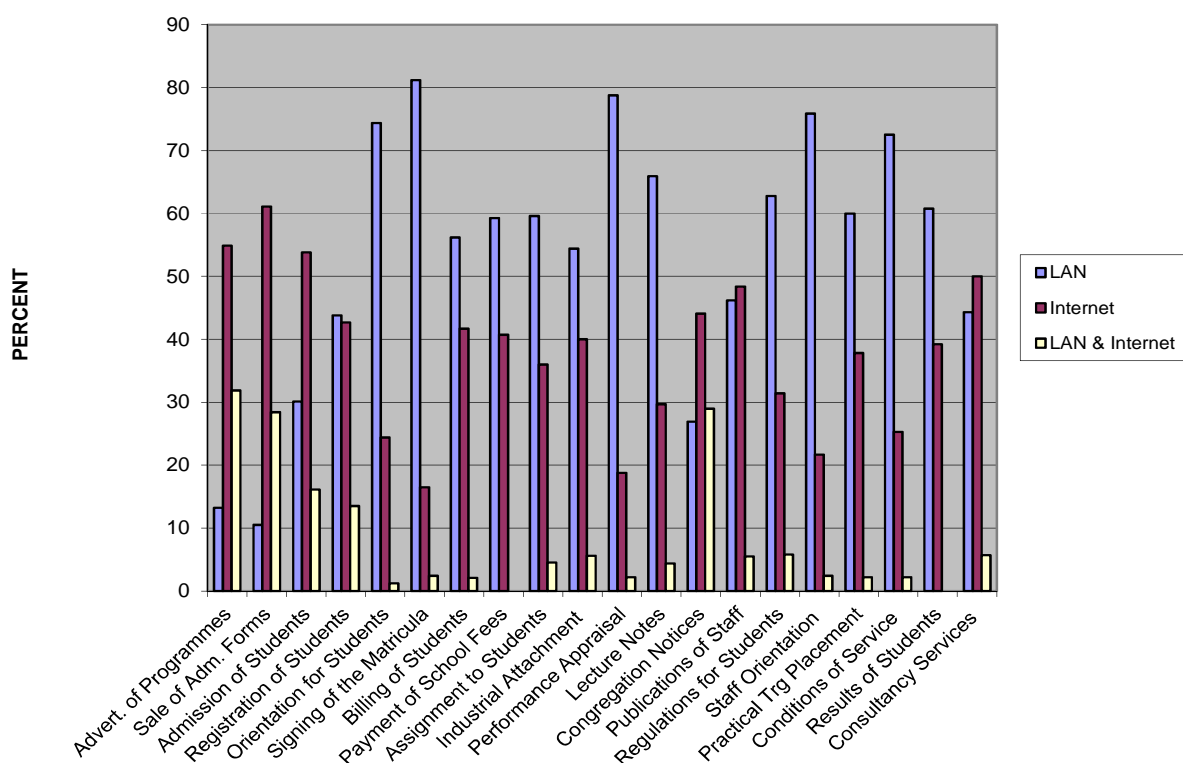
In assessing the benefits of the application of e-business to the value chain of educational programmes, 83% of the respondents observed that it would improve efficiency and effectiveness, 80 % said it would increase

productivity and reduce cost, and 79 % stated it would increase the speed of delivery, whilst 34 % pointed out that it would improve customer relationship.

Table 14: Assessment of the Benefits of E-Business

No.	Response	Yes (%)	No (%)	Total %
1	Improved Efficiency & Effectiveness	83	17	100
2	Increased Productivity	80	20	100
3	Reduced Cost	80	20	100
4	Increased Speed of Delivery	79	21	100
5	Improved Customer Relations	34	66	100
6	Total	356	144	100

Source: Field Data April 2009.

In an answer to the statement '*Application of e-business to the value chain activities of the Polytechnic would help to reduce cost, increase speed of operations, improve efficiency and maximise productivity in the transactions of the Polytechnic'*, 99.0 % of respondents either strongly agreed or agreed with the statement. In fact, 66.3 % strongly agreed with the statement, whilst 32.7 % agreed with the statement.

Table 15: Application of E-Business to the Value Chain Activities

Response	Frequency	Percent
Strongly Agreed	67	67.0
Agreed	32	32.0
Disagreed	1	1.0
Total	100	100

Sources: Field Data, April 2009.

In summary, it could be stated that creativity and appeal of website; ease of navigation; browser compatibility with software applications; and the alignment of website with the strategic goals and objectives of the Polytechnic's strategic plan, are important in securing maximum benefits from e-business application.

Efforts being made to address the Challenges and Constraints
In line with its ICT Policy, the management of the Polytechnic has arranged the procurement of 150 laptop computers for staff of the Polytechnic as part of a capacity building effort (Aboagye 2009). The training of staff in the application of e-business to the value chain activities of educational programmes has commenced, with the training of staff in the Department of Secretaryship and Management Studies. Members of staff in this department have received training in the use of the Internet for giving and marking of assignments, giving lecture notes and dialoguing with students. Efforts are under way to extend this training package to other departments of the Polytechnic (Dzineku 2009).

The Polytechnic has also entered an ICT Agreement in 2007, with SocketWorks Global, an international ICT service provider. Under the ICT Agreement, SocketWorks Global is expected to provide training to staff in computer applications and know-how, establish a scholarship Foundation with four percent of the revenue to be generated from the use of the facility to support needy students (Ho Polytechnic-SocketWorks Agreement 2007). In addition, SocketWorks Global was to provide servers to the Computer Laboratories of the Polytechnic.

The statement of works and obligations in the agreement has outlined the following benefits of the e-education platform:

- Acquisition of a robust and modern ICT infrastructure at startup
- Provision of automation of Ho Polytechnic's operations and processes
- Provision of affordable and regular 24/7 access to the Internet at full implementation
- Facilitation of better faculty-student relationship arising from improved information flow and transparency
- Reduction of cash based transactions within the campus to improve cash flow from a better fees collection process
- Development of a Distance Learning or E-Learning Platform from the extra income to be generated (Ho Polytechnic-SocketWorks Agreement 2007).

The SocketWorks-Ho Polytechnic Agreement is a move towards achieving the ICT Vision of the institution. This ICT Agreement, if properly executed, would benefit the Polytechnic and lead to an improvement in the ICT situation. Nevertheless the Ho Polytechnic-SocketWorks Agreement contains certain shortcomings or limitations which might have an adverse effect on the Polytechnic.

One of the shortcomings in the Agreement is the provision that Ho Polytechnic shall, *'Sign a perpetual software agreement with SocketWorks Ghana Limited.'* There is strong evidence of stiff competition in the global ICT environment, resulting in higher quality service and fast falling prices. One wonders whether it is prudent for any organisation to enter an agreement of perpetual application and implication in the 21st century of globalisation. This would mean that even when opportunities for higher quality software were available at cheaper prices, the Polytechnic cannot opt for them without a breach of this ICT Agreement (Bokor 2009).

In addition, there is a clause that states, the Polytechnic shall, *'Ensure compulsory payment of access fees per student per semester by all students and remittance of the agreed portion to SocketWorks'*. The Agreement is deemed to have come into effect in 2008. For well over a year now, very little has been done with respect to automation value chain activities of the Polytechnic as found out by this research. It is not clear how the remittances for SocketWorks Global would be determined, in the absence of an independent consultant, when the job has remained largely unexecuted (Bokor 2009).

Finally, SocketWorks does not appear to be getting the needed co-operation from the staff especially the heads of departments in the implementation of the terms of the agreement with regard to provision of information for upgrading the system (Dzineku 2009).

Table 16: Recommendation on the Application of E-Business to the Value Chain Activities

Responses	Frequency	Percent
Strongly Recommended	67	67.0
Recommended	32	32.0
Not recommended	1	1.0
Total	100	100

Sources: Field Data, April 2009.

When respondents were asked what their recommendation were on the application of e-business to the value chain activities of Ho Polytechnic, 97 % of the respondents recommended it. In fact 65 % strongly recommended it whilst 32 % recommended it for implementation.

Summary of Findings

A major finding of the research is that Ho Polytechnic continues to do the bulk of its value chain activities manually. For example, 96.8 % of advertisements were manually executed, orientation for students 98.9 %, signing of the Matricula 99.0 %, billing of students 83.9 % whilst placement of students for Industrial Attachment was 97.9 % manually accomplished.

Some students were given the opportunity to register their programmes online during the second semester of 2008/2009 academic year. Indeed this innovation recorded 19.8 % Internet registration of programmes by students. This Internet registration was due to the efforts of SocketWorks Global, contracted by the Polytechnic to automate the value chain activities of the institution.

Despite the ICT Agreement with SocketWorks Global in October 2007, for automation of the value chain activities of the Polytechnic, advertisement of programmes, orientation for students, signing of the Matricula, distribution of regulations for students, orientation for staff, distribution of conditions of service for staff and consultancy services of the Polytechnic, were not put on the Internet for the benefit of staff, students and the general public.

On the benefits of applying e-business to the value chain of the educational programmes of the Polytechnic, 83% of the respondents observed that it would improve efficiency and effectiveness, 80 % said it would increase productivity and reduce cost, and 79 % stated it would increase the speed of delivery. In fact, 99.0 % of the respondents recommended the application of e-business to the value chain activities of the Polytechnic.

Other challenges and constraints include; unreliable Internet connectivity and very slow functionality of the Internet when it is eventually available; inappropriate design of the current Computer Laboratory of the Polytechnic; frequent break down of available computers and air-conditioners due to fluctuating and unreliable power supply from the national grid; lack of funds to readily repair the computers and air-conditioners when they break down; inadequate technical know-how and competence in computer application among staff; difficulty in getting specified accessories, parts and equipment due to failure to involve consumer departments in the procurement process and limited number of polytechnic computers for staff and students to facilitate the deployment of a meaningful e-business venture.

The Polytechnic has embarked upon certain measures to confront the challenges and constraints facing it. Some of the measures include:

- The crafting of an ICT Policy to guide the ICT agenda of the Polytechnic
- Training of some staff in the application of e-business to the value chain activities of the institution
- Entry into an agreement with SocketWorks Global, an international ICT service provider, to provide a state-of-the-art automation to the Polytechnic in accordance with its ICT Policy
- Arrangement for staff to procure 150 laptop computers to boost computer literacy among them.

The Polytechnic could therefore, be deemed to be positioning itself for the business of e-business to reduce the cost of its operations, improve efficiency and effectiveness of delivery, and maximise productivity among its staff and students.

Conclusion

Most of the value chain activities of the Polytechnic are still manually executed, thus creating considerable frustration among staff and students in their teaching, learning and research work. There is, however, an overwhelming endorsement of the need to apply e-business to the value chain of the Polytechnic.

Recommendations

The study recommends the application e-business to the value chain activities of the Polytechnic to reduce the cost of its operations, improve efficiency of delivery, and maximise productivity among staff and students.To achieve this, the Agreement with SocketWorks Global, for automation of the value chain activities of the Polytechnic, should be reviewed to ensure that the institution gets value for money. The training package for staff should be extended to all the departments to build capacity for staff in the application of e-business to the value chain activities of the Polytechnic.

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