# TOWARDS A MODEL FOR NATIONAL E-LEARNING IMPLEMENTATIONS

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## INTRODUCTION

Many developed and developing countries including the U.S., Singapore, India, the Philippines, Korea, Thailand, European countries and Jamaica, among others, are engaging in the implementation of e-learning programs at a national level, albeit at different stages of the implementation (Pagram and Pagram, 2006; Trindad, 2002). According to Kearns (2002 p.ii), "the impact of globalisation, information and communication technologies, and the accompanying shifts in the economy, labour market, and in the operations of enterprises have led to fundamental changes in the economy and society that have profound implications for the role of education and training." The traditional means of education is no longer sufficient to satisfy the training needs of a knowledge society. Increased educational outcome has taken on greater importance because competitiveness on a global scale is based on the educational level of human resources (Osin, 1998). Many believe that the use of technology in education has great potential to transform human capital (Barr and Tagg, 1995; Cooper, 1993; Glennan and Melhed, 1996; Harasim, 2000; Nachmias, 2002). The promised benefits of e-learning in producing improved educational outcomes have driven countries to embrace e-learning (Pagram and Pagram, 2006). However, e-learning implementations, for the most part, are entered into without a clear plan and limited knowledge of all the pre-requisites for success (Minges, 2001). Ismail (2002) identifies the lack of a clear cohesive strategy as one of the missing ingredients associated with e-learning programs.

Urdan & Weggen (2000) define e-learning as the delivery of content via all electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, and CD-ROM. There is much anecdotal evidence and some research to corroborate the benefits of e-learning over traditional classroom instruction. Bashar and Khan (2007) pointed out that the Singapore Master Plan for IT in Education Report 2001 revealed that more than 70% of surveyed pupils indicated that IT helped to increase their knowledge and 80 percent of surveyed pupils confirmed that use of IT made lessons interesting. According to the Gartner Group, the retention of e-learning is twice as high as that of traditional classroom instruction, at half the cost. The benefits that are highlighted in the literature include people empowerment and human capacity building (Kante and Savani, 2003); increased knowledge level and technical competency (Zahran, 2003); convenient access to education (Bashar and Khan, 2007); increased chances of being able to target students with varying learning abilities and styles by providing learning via multiple media and through multiple channels (Haddad, 2001); enhancement of critical thinking and other higher levels of cognitive skills and processes (Haddad, 2001); the ability to track a student's progress and a more effective way of assessing and guiding students (Glenan and Melhed, 1996). E-learning is deemed to facilitate life-long learning which is necessary for continual development of human capital.

In this research we are interested in understanding appropriate strategies for e-learning implementations at a national level. Some countries have published national strategies for the use of ICT in education (eg. Austria, Finland, France, Singapore, Philippines, Germany, Greece, Luxembourg and Portugal), yet others do not (eg. Haiti, Italy, Ireland). National strategies and action plans are seen as an indicator of a prioritized national effort. We define a national e-learning implementation as a government led strategy to facilitate the use of e-learning within a country to transform its human capital. An e-learning programme at a national level should involve both public and private sectors, education and training institutions at all levels, as well as the relevant social, industrial and economic players. The government has the ability to influence public policy, teaching models and to provide the necessary infrastructure to support lifelong learning for all groups in the society (Zahran, 2003).

The basic characteristics of a national e-learning initiative include ICT infrastructure to connect e-Learning system users, learners, teachers and administrators; it should form part of the national ICT or the national education plan and the implementation is usually monitored by a central body, appointed by the government and aligned with both the national entities responsible for education and for technology (Bates, 2001; Glenan and Melhed, 1996; Zahran, 2003). For example there is a national e-learning center in Malaysia; e-learning Jamaica, an incorporated company in Jamaica; and the Infocomm Development Authority in Singapore.

There are some countries that seem to be better able to carry out a national e-learning implementation successfully than others are able to (Bashar and Khan, 2007; Minges, 2001; Pagram and Pagram, 2006). For example, Singapore's e-learning initiative has produced a skilled workforce and significant economic growth due to increased revenue from e-learning. Singapore has developed expertise in e-learning and is able to supply e-learning services to other countries (Bashar and Khan, 2007). On the converse, a national e-learning initiative in The Phillipines has resulted in only a slight improvement in literacy levels (Trinidad, 2002). Boyd-Barrett (2000) observed that implementations of learning technology are neither uniform nor standard. Each country's' characteristics at the commencement of the initiative are different. Characteristics such as financing, technical infrastructure, the current state of the educational system, teaching/learning styles, the language spoken, the literacy level of the population, the expertise and training of academic staff may play a part in how well that country proceeds with the implementation and the benefits that may or may not materialize. Zahran (2003) argues that a single strategy may not always be possible for all countries in the implementation of e-learning infrastructure, but that any strategy should be flexible and adaptable.

There are several factors that influence the achievement of a cohesive and coherent strategy for national e-learning implementations. Firstly, the initiative has to be led by the government to benefit a greater number of people. The government's role should involve leadership, dissemination of information on effective practice, fostering the development of organizations capable of assisting educational institutions to make effective use of technology and funding of

research and development (Zahran, 2003). Any single educational institution will only be concerned about its own autonomy and survival. The commitment from the government can foster greater commitment among academic leadership and staff (Wiboonuppatum, 2006). They can assist with funding and get the necessary support for the initiative in place. They can provide nation-wide infrastructure.

Secondly e-learning implementations are costly and require significant and sustainable funding to ensure that adequate infrastructure is deployed at the start-up of the initiative and that on-going funding is available to support further development and growth (Bates, 2001). Implementations, if not properly managed, will be plagued by cost overruns. An example of this is the UK e-University project, launched in September 2003, which had to be wound up having spent €75.000.000 million of public money out of an allocation of €93.000.000 but having succeeded only in attracting 900 students out of a targeted 5,600. Bates (2001) argues that a national e-learning implementation requires, at a minimum, millions of dollars investment per year. Governments should be able to link the vast investments in infrastructure and the use of that infrastructure in delivering educational benefits. Previous research has investigated whether information technology investments contribute to the realization of value (Barua et al, 1995; Hitt and Brynjolfsson, 1996; Kohli and Devaraj, 2004; Melville et al, 2004; Soh and Markus, 1995; Weill, 1992). Such research has not been done in the context of e-learning.

Thirdly, there is a proliferation of factors identified in the literature as influencing the outcome of national e-learning implementations. These factors range from the critical role played by culture, ICT skills, appropriate pedagogy, infrastructure, training of teachers, students and technical support staff to content creation (Friesner and Hart, 2004; Pagram and Pagram, 2006). However there are fundamental gaps in the available knowledge which may be contributory to implementations remaining inundated with problems (Pagram & Pagram, 2006; Samuel and Zaitun, 2007; Trinidad, 2002; Yun & Murad, 2006). A few of the critical gaps in knowledge include an incomplete understanding of the role of infrastructure in the implementation. ICT Infrastructure is regarded as fundamental to the success of e-learning implementation (Bashar and Khan, 2007; Zahran, 2003). Yet, the amount and quality of infrastructure that should be

deployed in the implementation is not known. Conversion of the inputs of the implementation into assets to be utilized is also necessary. There is much debate in the literature about the appropriate training that should be given to teachers and students to transform them to assume their new role in the implementation (Crichton and Labonte, 2003; Jones, 2000). Many issues relating to implementation and use have not been addressed. They include issues such as governance which is critical in such a large implementation with so many levels of interdependence between all entities, project management for an implementation that can span many years, change management, and also risk management. Finally, a most important element for success is the issue of how the benefits can be sustained over a long period of time to create a change in society. Corea (2000) posits that the change in society from the implementation of technology would be a gradual process.

Careful planning should be at the forefront of any e-learning initiative (Naidu, 2006). Failure to realize value from technology investments can be attributed to the lack of an effective strategy for planning, implementing, evaluating and institutionalizing the payoffs from investments (Kohli and Devaraj, 2004). Governments should have a clearly articulated strategy for the use and implementation of e-learning in order to realize its benefits (Carnoy, 1999). Yet, Glennan & Melhed (1996) purport that many countries are unsure of what strategy to use when implementing ICT in education.

This paper proposes a model that links, in a coherent set of steps, the investments in e-learning infrastructure to outcomes from that investment. This framework should provide an understanding of the necessary resources, skills and processes for a country to pursue a national e-learning infrastructure implementation and will seek to answer the following questions:

**(1)What e-learning conversion capabilities are essential to the creation of e-learning assets?**

**(2)What e-learning use management skills are needed to ensure proper implementation and use of e-learning assets?**

**(3)What sustainability factors are needed to ensure e-learning outcome?**

This research makes a theoretical contribution to the e-learning research area. Nichols (2003) purported that most of the literature on e-learning is usually practice-based and presented in a descriptive format. There are few examples of academic literature specifically concerned with national e-learning implementations. The use of technology in education has tended to be technology-led rather than theory-led (Ravenscroft, 2001). The rest of the paper is organized as follows: A discussion of the theoretical underpinnings of the research follows, then the presentation of the conceptual model and finally the conclusion of the paper.

## THEORETICAL UNDERPINNINGS

This research adapts the conceptual framework provided by Soh and Markus (1995) on IT and business value. Soh and Markus (1995) consolidated a process theory model from a priori work of several researchers (Grabowski and Lee, 1993; Markus and Soh, 1993; Sambamurthy and Zmud, 1994) to show how, when and why firms may realize value from IT investments (Figure 1). Barua et al (1995) proposed a model to measure IT impacts, Kohli and Devaraj (2004) elucidated a process for managing IT investments and to measure the business value of those investments, while Hitt & Brynjolfsson (1996) investigated the effects of IT investments. Most of these utilize variance theory. We are interested in how to achieve e-learning outcomes. Soh and Markus (1995) and Mooney et al. (1996) argued that IT does not impact firm performance directly but its impact operates through a web of processes. Therefore a process theory model is used in this research because this theory combines the necessary steps to achieve outcomes in a recipe where the sequencing of the steps is critical (Mohr, 1982) while accepting the presence of discontinuities as well as unexpected and unforeseeable displacements and realignments.

## SOH AND MARKUS' (1995) PROCESS THEORY FRAMEWORK

In Soh and Markus' (1995) framework there are three processes and four constructs. The three processes are IT Conversion, IT Use and the Competitive Process. The IT Conversion Process is

the set of IT management factors that converts IT expenditure into IT Assets. IT Use Process is the process of ensuring that the IT assets are appropriately applied by the users as this is one way to ensure that the desired impact of an information technology investment is realized. The Competitive Process includes all those external factors such as the competitive environment and macro-economic issues which affect how IT impacts are translated into organizational outcomes. The four constructs are IT Expenditure, IT Assets, IT Delivery Impacts and Organizational Performance. The model assumes that some IT expenditure takes place that will eventually result in value to the organization. Through an IT conversion process management expertise or skill is applied to the IT expenditure to produce the IT Assets. Soh and Markus (1995) lists some possible IT Delivery impacts such as new products/services, redesigned business processes, better decision-making and improved coordination flexibility. Outcome occurs when organizational impacts due to IT investment combine with favorable economic and environmental conditions to provide some change in financial performance, increased stakeholder equity or increased productivity.

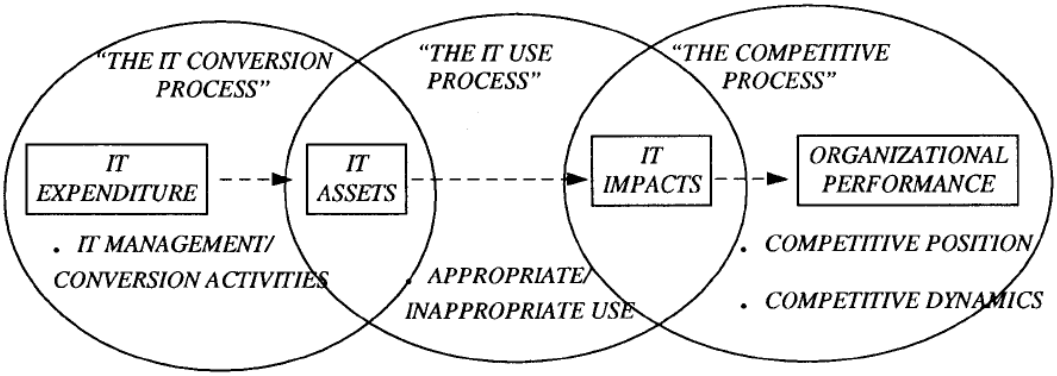


**Figure 1. Soh and Markus 1995 Process Theory Model**

## A CONCEPTUAL MODEL OF E-LEARNING IMPLEMENTATION

In this research we adapt the Soh and Markus' (1995) framework to fit the context of national e-learning implementations. Similar to the original framework, this model has four constructs and 3 processes (See Figure 2).

## E-learning Infrastructure

E-learning infrastructure is a pre-requisite for the creation of e-learning assets. E-learning infrastructure can be categorized into IT physical capital (Barney, 1991; Ross et al, 1996), IT human capital (Barney, 1991; Ross et al, 1996), IT relationships (Ross et al, 1996), new and those currently in existence, and complementary resources. Melville et al (2004), drawing on Barney (1991), posit that these complementary resources are those non-IT physical and non-IT human capital resources that provide a good fit with the technology that is being implemented. We separate our construct into two parts: existing e-learning infrastructure and new e-learning infrastructure investments that are necessary because of the shortfall of existing resources. E-learning infrastructure investments are the new investments that are needed for the implementation such as new equipment, networks and learning management systems. Availability of the infrastructure is also crucial to the project as one of the major reasons for teachers not using technology in their classes is the shortage equipment available for their use (Jones, 2004). Assets result from the infrastructure employed in the implementation as articulated by Soh and Markus (1995) after the necessary management conversion processes are applied. An assessment should be made of the existing infrastructure and a decision made on what additional infrastructure need to be procured in alignment with the government's strategy (Grabowski and Lee, 1993). Careful assessment of the technology needed increases the chances of the technology being converted into an asset.

**P1a: There is a direct relationship between e-learning infrastructure investments and the creation of e-learning assets.**

**P1b: The quality of existing e-learning infrastructure has a direct effect on the speed of conversion to e-learning assets.**

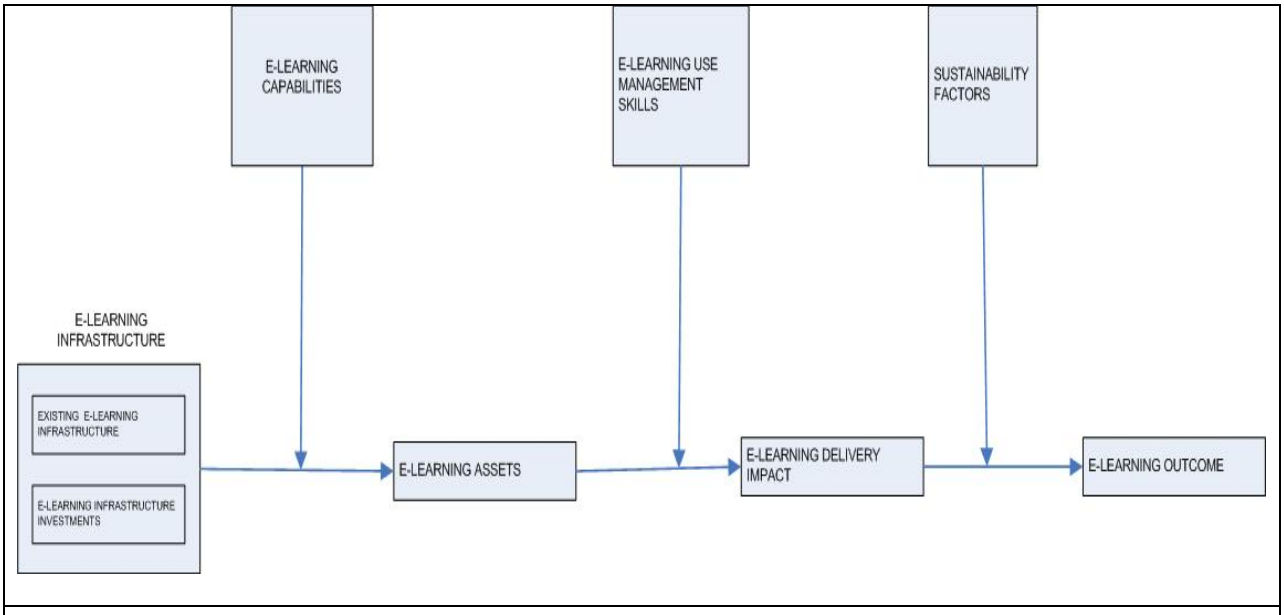


**Figure 2. A Model of National E-learning Infrastructure Implementation**

## E-learning Assets

E-learning assets result from the application of e-learning conversion capabilities on e-learning infrastructure. E-learning Assets are divided into four categories: human IT and human non-IT assets, technology and non-technology assets, learning content and relationship assets. Human assets refer to the skills and knowledge possessed by the teachers, students, equipment maintenance staff and training content developers after the conversion process of human capital development has been applied to the human infrastructure. Technology assets are the IT equipment, connection technologies, technology platforms and internet infrastructure resulting from the conversion process of IT infrastructure capability. Learning content assets refer to content that is represented in a digital format to effectively deliver pedagogy, and is structured in such a way to allow for ease of navigation, self-teaching, easy access and self-test. Relationship assets are the expertise, knowledge and support for the implementation that may occur as a result of the linkages among the stakeholders in the project. At the beginning of the implementation there will be relationships existing between academia, public and private entities. These relationships will need to be enhanced and maintained during the implementation. New relationships may be created such as outsourcing relationships which may lead to the creation of additional social capital (Nahapiet and Ghosal, 1998). Relationships assets are produced after the

application of relational capability. These relationships are assets that facilitate ease of implementation because of the mutual understanding of the goals of the project.

E-learning conversion capabilities enable the creation of e-learning assets. These can then be configured to create desired impacts. However, for e-learning assets to create improved impacts they must be properly implemented and used appropriately. There are many drivers of e-learning acceptance which influence how teachers, students and principals participate in the implementation (Wiboonuppatum, 2006). Additionally, like all other projects, the appropriate management skills such as change management may be necessary to ensure that e-learning assets are properly implemented and appropriately used. The chance of achieving desirable impacts from the implementation increases with quality e-learning assets in place.

**P2: There is a direct relationship between e-learning assets and e-learning delivery impact.**

## E-learning Delivery Impacts

Millions of dollars are invested in an e-learning project and thus it is important to achieve positive impacts from the investment. Samburmurthy and Zmud (1994) indicated that impacts occurs when there are new products/services, redesigned business processes, better decision-making or improved coordination flexibility. E-learning implementation may result in the creation of new learning content, redesigned teaching processes due to educational transformation activities, increased confidence level amongst the teachers because of improved technical and instructional competency, improved technical competency amongst human infrastructure support personnel and improved technical and educational skills amongst students. E-learning may lead to an increased level of confidence with the use of technology as well. E-learning impacts may not necessarily result in the desired e-learning outcomes if enough attention is not given to the sustainability of the project such as institutional support in the form of funding, the appropriate legislation for e-learning and constant research into improving e-learning activities.

**P3: There is a positive relationship between e-learning delivery impact and e-learning outcomes.**

## E-learning Outcomes

E-learning outcomes may include such things as well trained and competent teachers, reduced educational delivery costs, and an educated and technically competent population (Zahran, 2003). E-learning impacts sustained over time translate into e-learning outcomes once the process of sustainability is applied. Some of the factors influencing e-learning outcomes are context (Walsham, 1993), infrastructure (Bashar and Khan, 2007), and supporting complementary resources (Brynjolfsson and Hitt, 1998). Corea (2000) posited that critical capabilities can be created through incremental development of the society. Over time, the continued realization of positive e-learning impacts can lead to a knowledge based and technically competent society.

## E-learning Conversion Capabilities Process

Conversion capabilities are those higher-order management skills that configure infrastructure to create assets (Soh and Markus, 1995). E-learning conversion capabilities have a moderating effect on the relationship between e-learning infrastructure and e-learning assets. Based on an extensive review of e-learning and IT implementation literature we have identified some necessary capabilities for a national e-learning implementation.

### *Human Capital Development Capabilities*

Human capital capabilities refer to the human development skills needed to develop, nurture and shape the human capital necessary within the e-learning implementation to produce human assets. Some of the important groups that will need to have their skills upgraded are teachers, students, infrastructure support personnel and learning content personnel. When there is an e-learning implementation teachers will experience a role transformation (Zahran, 2003). Teachers will now have to become facilitators of learning and this position requires more creativity and

skill than before. The desirable attributes of a teacher in this new learning environment has been debated by many (Goodyear et al, 2001; Trinidad, 2002). Trinidad (2002) argued that a strong educational background is necessary for students to embark on e-learning while Bates (2001) referenced the Conference Board of Canada's 1991 and listed the skills needed by students participating in e-learning. Bates (2001) identified four levels of human support needed to ensure the functionality of e-learning technology: technology infrastructure support staff, educational technology support staff which includes graphics designers and interface designers, instructional design staff who provide educational services and expertise, such as instructional design to support the use of technology for teaching and subject experts such as professors, instructors, teachers or subject matter experts who create content and provide the teaching over the networks and infrastructure.

*IT Infrastructure Capability*

IT infrastructure capability is the enabling base of shared IT capabilities which provide the foundation for other business systems (McKay and Brockway, 1989). This capability includes both the internal technical (equipment, software and cabling) and managerial expertise required to provide reliable services. Grant and Chen (2004) referred to IT Infrastructure capabilities as the "technological backbone" of an implementation which ensure that the implementation meets the current requirements and any other requirement in the future. IT infrastructure capabilities are constantly evolving and expertise is accumulated over time (Duncan, 1995). The effective use of e-learning necessitates having adequate technological infrastructure in place (Bashar and Khan, 2007). ICT is a cornerstone for transforming societies hence developing IT infrastructure capabilities for education and training is key to creating a new information and knowledge-based society. IT infrastructure capabilities are tacit and are embedded in routines and processes. Lall (2001) identified linkages as an important aspect of technical capabilities as capabilities cannot be developed in isolation. Forming and maintaining these networks is necessary as the e-learning management center cannot produce all the expertise to handle every aspect of the project. IT infrastructure capability may not reside with any one individual or company but could be shared amongst persons within an organization or across organizations especially when technology services are outsourced (Grant and Chen, 2004). The creation of IT infrastructure capability for

technology implementation at a national level becomes more difficult due to the volume of expenditure undertaken for such an initiative and the need to contend with greater levels of interdependence across various public and private entities (Bretschneider, 1990).

*Educational Transformation Capability*

Educational transformation capability includes all the necessary activities needed to restructure the educational system to be able to produce a world-class work force. Kinnaman (1994) purports that successful integration of technology into curriculum requires basic changes to the learning model. When an e-learning implementation is initiated, IT may in some cases be used to automate the information delivery function in classrooms. However, Leidner and Jarvenpaa (1995) argue that this would only "speed up ineffective processes and methods of teaching". Thus it may be necessary to change the learning model when implementing e-learning for it to be most effective.

*Institutional Support Capability*

A substantial amount of funding has to be identified for a national e-learning infrastructure implementation. This would no doubt be included in the country's technology or education budget. The government can provide tax benefits or other financial incentives to encourage the up-take of e-learning. The incentive should be widespread and help to develop a climate for life-long learning (Zahran, 2003). Partnerships between the public and private sectors have the potential to: provide longer-term investment strategies; encourage the exchange of experience and best practice; promote dialogue on future requirements for multimedia learning materials; enhance technology transfer; and ensure that business skill needs are taken into account. The government should also enact any legislation that would support the use of e-learning.

*Learning Content Creation Capability*

Learning content creation capability is the skill needed to acquire learning content to ensure a tight fit between the content and the curriculum and the appropriate representation of teaching

concepts with technology. It is a challenge to produce pedagogically coherent learning content for an individual learner's needs and preferences to create a learner-centered environment (Turker et al, 2006). Content should have the culture of the society in which it will be used embedded in it (Pagram and Pagram, 2006) and Zahran (2003) posits that content should be in the local language and English. If current learning materials are in paper form, they need to be converted into digital form. This is not a straightforward transformation.

*Relational Capability*

According to Wilson & Stacey (2003) "the interaction between the technical and support staff, the educational developers and the academic staff provides a rich source of innovative pedagogical ideas and technical problem solving strategies and establishes closer links between these sectors of an institution that can only make other more traditional professional development, such as workshops or technical skill sessions more meaningful and relevant for the wider institution." A successful e-Learning program should be based on the collaboration between education professionals, students, governments, and industry.

*E-learning Research Capability*

One of the challenges when trying to build research capability is to lessen the gap between practice and research. Research is too often driven by a technology agenda and may involve academic evaluation methodologies that do not fully meet the requirements of training environments. Private sector engagement is necessary in supporting and using the outcomes of research. The study of the pedagogical paradigm (how we learn) should be given priority. The research effort needs to be multidisciplinary and additional funding is likely to be required (Zahran, 2003).

**P4: The association between E-learning infrastructure and E-learning Assets will be greater with higher levels of E-learning Capability.**

**E-learning Use Management Process**

E-learning management skills are delivery mechanisms needed to coordinate the implementation and use of elearning assets. Appropriate use of e-learning assets will result in e-learning impacts. E-learning management skills are critical as there are many implementation and use factors that could hinder the success of the project such as: level of availability of infrastructure (Pelgrum, 2001), technical support systems, a clear policy on implementation, evaluation and curriculum re-orientation (Leem and Lim, 2007; Omwenga et al, 2004), and academic staff and student technical skills (Trinidad, 2002). Project management expertise is essential because -learning infrastructure implementations incur massive costs and significant time investments and therefore the activities within the project have to be carefully monitored to prevent time and cost overruns. Resistance to the change associated with the elearning infrastructure implementation has also been identified as an important issue to be dealt with (Totter et al, 2006). Orlikowski and Hoffman (1997) recognized technological change as consisting of a set of iterative changes from anticipated, emergent, and opportunity-based changes. A change management program is essential for the schools because of the many challenges that may result from the implementation – teachers will need to change the way they deliver pedagogy; teachers will have to undergo training; teachers may begin to communicate and collaborate with their peers in new ways; a new learning model may be introduced; students may need to communicate with each other and with teachers in new ways. There should be systems in place to manage the quality of content when it has been prepared. Pedagogy-technical compatibility is also essential for the effectiveness of delivery of material. Appropriate governance will be very critical in a project of this magnitude with various stakeholders and levels of accountability. All aspects of the implementations should conform with government goals and policies. It will be critical to determine whether and in which cases decision making should be centralized or decentralized.

**P5: The association between e-learning Assets and e-learning delivery impacts will be greater with higher levels of e-learning use management.**

**Sustainability Process**

There may be factors that can prevent the impacts of the implementation from resulting into e-learning outcomes. Soh and Markus (1995) asserted that outcomes occur after impacts combine with favourable conditions or environmental factors. These factors are identified as sustainability factors. There is also the need for continued institutional support – funding for infrastructure, legislation – copyright laws to content, destruction of property, electronic laws. Human capital development especially for teachers and technical support staff has to be ongoing. All relationships have to be maintained for the project to produce result. The research capability plays an important role in the sustainability of the project and the realization of e-learning outcomes.

**P6: The association between e-learning delivery impact and e-learning outcomes will be greater with higher levels of Sustainability Factors.**

## RESEARCH METHODOLOGY

A concurrent triangulation research design for mixed methods will be used for this research (Figure 3). This approach includes the use of both qualitative and quantitative methods (Dube and Pare 2003). Lee (1991) indicates that the combination of the two methods provides a rich approach to solving problems. In this study, the case of a national e-learning implementation in Jamaica will be examined. Case research is appropriate when the area being studied is complex and context dependent (Benbasat et al 1987; Yin 1994) and is a new research area such as in the case of national e-learning implementations (Eisenhardt,1989).

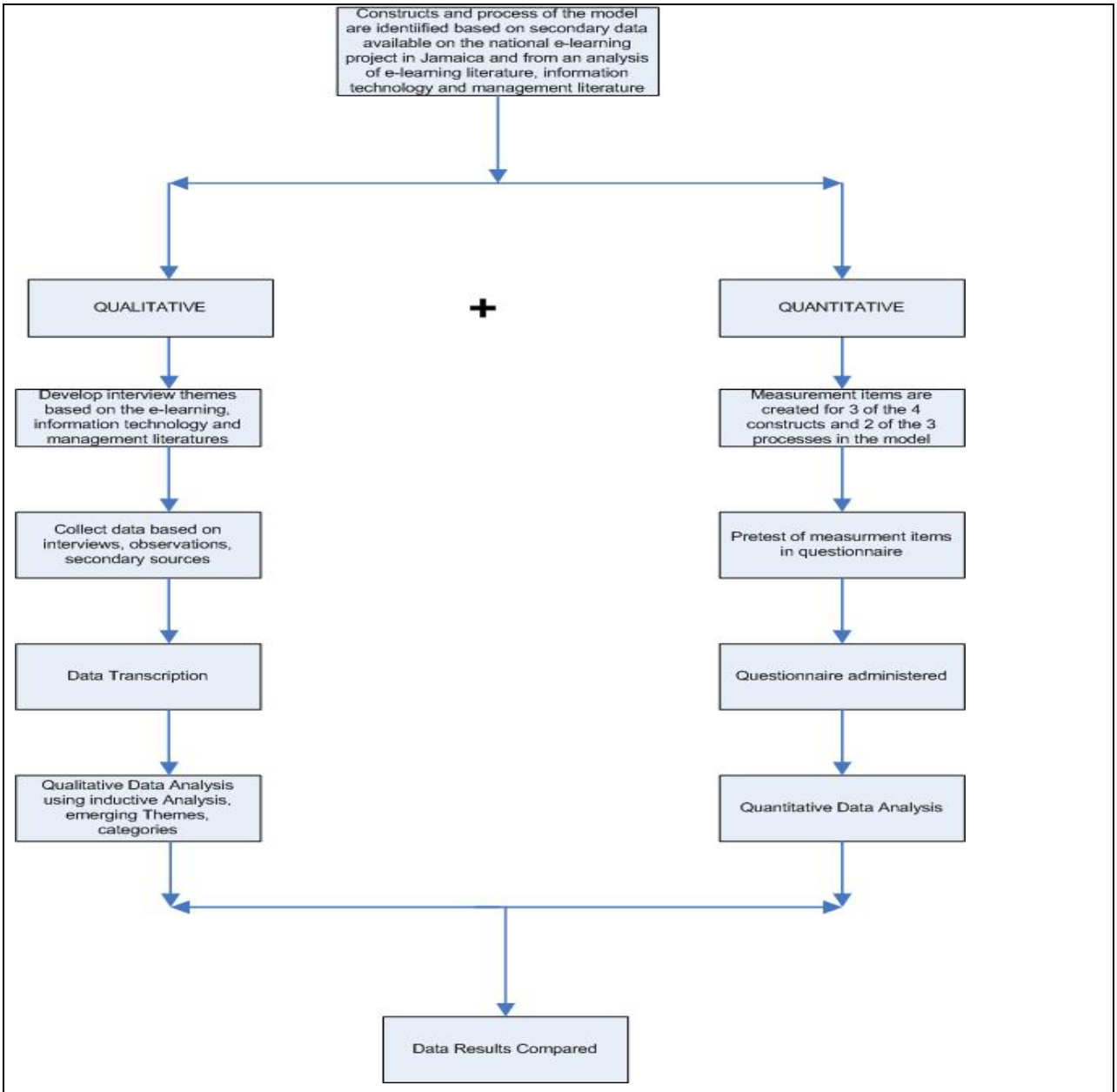


**Figure 3. Representation of The Concurrent Triangulation Research Design**

This Jamaica case study was chosen according to Peppard's (2001) three criteria for selection: purposeful sampling, availability of multiple sources of information and willingness to cooperate. While the choice of this case is opportunistic (we are able to follow the progress of the implementation from near inception and have access to both personnel and material), it also conforms to the ideal of a theoretically useful case (Eisenhardt, 1989; Ragin, 1999). This

implementation is presently in the pilot phase. The unit of analysis is E-learning Jamaica Limited, the government entity with responsibility for the implementation. The focus will be on how E-learning Jamaica Limited executes the charge to implement e-learning at the secondary educational level.

Both the quantitative and qualitative data will be collected simultaneously but analyzed separately. The findings of both methods will be compared for convergence or divergence (Creswell, 2003). For the qualitative aspect of the research, various data collection methods will be employed so that there can be triangulation of evidence. Data will be collected by way of interviews, secondary data and observation. The interview themes will be based on the measurement items identified for the constructs and processes of the model. Qualitative data analysis will involve inductive analysis and the identification of themes and categories from the data. For the quantitative aspect of the research, a survey questionnaire will be constructed based on the measurement items created for the constructs and processes. This will use a Likert-like scale. Construct validity and reliability will be checked using factor analysis and cronbach's alpha respectively. The questionnaire will be pre-tested and then administered to e-learning management personnel, academic staff, students, technical support staff and other public sector personnel engaged in the e-learning implementation. The relationships proposed in the model will be tested applying the appropriate structural model.

## CONCLUSION

This paper presents initial work to develop a model for national e-learning implementations. A process theory approach is used hence the limitation exists that not all factors affecting the creation of e-learning outcome from e-learning infrastructure have been mentioned. However process theory admits the existence of discontinuities and the fact that more powerful causal factors will influence outcome. It is hoped that the national e-learning implementation model will provide some guideline on the how and what of carrying out these types of implementations as national e-learning implementations can enhance the competitiveness of nations. This model may be beneficial to decision and policy makers who are charged with implementing e-learning on a

national scale in a bid to develop the human capital within their country. Several propositions are formulated which can be empirically tested in the future to provide further insight into the various relationships in the model.

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