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Editorial

I am pleased to publish this maiden issue of the London School of Business and Management's (LSBM) Working Paper Series (WPS). This issue is a culmination of the research activities undertaken by both staff and students at LSBM. It serves the dual purpose of stimulating debates on topical research and scholarship matters amongst the LSBM community and its stakeholders (policy makers, employers, the media and networks in other institutions).

The papers in this maiden issue have a common theme that underpins the core values of LSBM - notably servant leadership, which in layman’s terms, simply translates to putting others first and self, last.

The WPS coincides with the launch of the research seminar series which would provide the much needed platform for sharing our ongoing research with colleagues – both within LSBM and the outside – as well as providing the much needed avenue for active research and scholarship across these platforms. It would also prompt staff to consider developing live case studies geared towards supporting our teaching and learning engagements.

The initiative would also provide the requisite environment for mentorship, servant-leadership and collaborative opportunities between academics, administrative staff, as well as with both existing and past students – all with experiences to share.

Indeed, this maiden issue includes two student papers and two staff papers with partners in other institutions. It also features a keynote paper from a world renowned Servant Leadership scholar from the United States who presented a keynote address at the Teaching & Learning Conference hosted by LSBM in 2015.

Although the five articles in this maiden issue cover a range of topics, they are still underlined by a common theme on higher education and enterprise development.

In the first paper, Professor Edward Queen kick-starts the issue with a discussion of the role of servant leadership in higher education. He starts off with an introduction into the servant leadership discourse drawing upon his personal initial encounter with the concept. He also highlights an important first reaction – i.e. inertia at embracing the philosophy. Following this, the study examines how the philosophy sits in the context of higher education, as well as the role it could play in “saving higher education […] from its current malaise.” He concludes his study with an interesting quote from the great Economist, John Maynard Keynes: “The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct economist […] It is ideas […] which are dangerous for good or evil.”

Picking up from the inferred ideas summed up above, Cedric Nosa and Nnamdi Madichie, without any explicit reference to the concept of servant leadership, set about showcasing how the skills in the European Computer Driving Licence (ECDL) could serve as a development tool in Higher Education. The context of their study is a London University, which has leveraged ECDL to the enhancement of the employability of its students. Adopting an action research protocol, these authors, traced the trend of ECDL within a five-year period – i.e. from its launch in December 2005 to the 2010/2011 academic year. They argued that ECDL had the capacity to improve learners’ understanding of computers, and enables efficient use of software for academic purposes – with a view to further developing enterprise education, itself a buzzword for 21st century higher education. In their summation, the authors posit that ECDL certification prepares students for life after university – and citing the experience of the London University – and its exposition of good practice, which they hope, would be of value to key stakeholders in education notably – students, universities and employers.

As if to respond to the benefit of eLearning technologies, the first student paper (but third) paper in this issue, by Iona Tuns, highlights the potential of semantic web technologies for student engagement analytics. His study, which is culled from his undergraduate dissertation as a Business Computing
student, investigates whether, and to what extent, the implementation of Semantic Web technologies can further improve the learning analytics tools as well as the analysis of student engagement. Based on interviews with academic staff and educational professionals (e.g., lecturers and administrators) who shared their views and experiences on the use of student engagement tools, the study finds that the implementation of Semantic Web technologies can provide relevant information for learning analytics. For example, using the Learning Object Ontology (LOCO), can provide a thorough understanding of student learning process through their activities, interaction with the learning content and general behaviour within the virtual learning environment or VLE, and that a graphical representation of those activities will provide a better understanding of student engagement. As a result both academic staff as well students will be able to reflect upon their learning process in relation to the rest of the participants, which can motivate the students and support the lecturers for enhancing their teaching process. However, the study cautions that further research is therefore necessary to continue improving the field.

In the fourth paper (a second student contribution), Timothy Hassan, investigates the impact of e-publishing on the future of libraries by drawing upon a sample of librarians and archivists. The study sought to achieve five key objectives – notably to examine how the preservation of electronic publications has changed throughout the development of e-publishing and the impact of these changes on libraries; examine the evolution of libraries since their adoption of electronic publications; evaluate the challenges of digital preservation and cataloguing metadata and the issues that the libraries are facing in the digital age; suggest ways in which libraries can improve cataloguing metadata for different types of electronic publications including web content; and identify the avenues for libraries in fully designing and implementing a robust cataloguing metadata standard – with a view to achieving sustainable digital preservation of electronic publications.

The final paper in this issue remains on the topic of enterprise and/or entrepreneurship taken from a practitioner lens. Indeed, Knowledge Mpofu and Sinfree Gono explored the inter-relationships between information communications technology (ICT) adoption factors in the small firm sector in countries of southern Africa. The paper draws and builds upon previous research that focused on issues related to ICT adoption process among SMEs operating in three countries – South Africa, Botswana and Zimbabwe. The ICT adoption theories derived from the Technology Acceptance Model and Diffusion of Innovation enabled these authors develop their GESTOO (Government role, Environmental, Social networks, Technological, Organisational and Owner-manager) model. The results highlighted the influence of several key factors that include GESTOO on the ICT adoption process of SMEs. In their summation the authors hope to have provided insights that should inform both policy and practice from the perspective of SMEs in developing world contexts taken from the experiences of countries in the southern Africa region.

Overall, this WPS would be the main conduit of the activities of the Centre for Research & Enterprise at the London School of Business and Management, and would be mapped with the research & Scholarship strategy which is currently in its final stages of development with a view to encouraging participation from all aforementioned stakeholder groups.

Nnamdi O. Madichie
Series Editor, January 2016
Servant Leadership in Higher Education

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Abstract

This article strives to discuss the role of servant leadership in higher education. It begins with an introduction to synopsis of servant leadership. I do this partially do through a discussion of my first encounter with it and my initial resistance. Second, the article examines discusses higher education as servant leadership and how, to my mind, a greater attention to that could play a major role in saving higher education, particularly liberal education, from its current malaise. Finally, it addresses how we can educate for servant leadership and how the process of such education, if done well, actually does return us to a realization of the fundamental purposes of higher education.

Keywords: Servant Leadership, Higher Education, Critical Reflection, Practitioner paper

Introduction

Any discussion of servant leadership and higher education implicates many dimensions. This fact will lead me to violate the dictum Eugen Rosenstock-Huessy that all good books [and articles] are about one thing. This article will be about at least three. To begin it is valuable to give a quick reprise of the origins of Servant Leadership, which I will do through a discussion of my first encounter with it and my initial resistance. Second, the article examines discusses higher education as servant leadership and how, to my mind, a greater attention to that could play a major role in saving higher education, particularly liberal education, from its current malaise. Finally, it addresses how we can educate for servant leadership and how the process of such education, if done well, actually does return us to a realization of the fundamental purposes of higher education.

Servant leadership – An initial encounter

My first encounter with servant leadership came about nearly 24 years ago. I was a new program officer at the Lilly Endowment, a foundation based in Indianapolis, Indiana where part of my portfolio included leadership development. As I struggled to grapple with what this meant, I increasingly realized that one name regularly emerged in the conversations of my colleagues that of Robert Greenleaf and indeed the Greenleaf Centre was fairly large recipient of our largesse. In order to do my job better, I realized that I would have to become better acquainted with his biography and writings. I turned first, as does almost everyone, to the *Servant as Leader*, the pamphlet Greenleaf published in 1970.† To be perfectly honest, I was ambivalent. While deeply impressed with normative dimension of his writing and the very practical history of his experiences, I could not get past the “presentistic” tone of the piece and how much of it was coloured by the social realities of the late 1960s. Additionally, I failed to grasp the depth of understanding that lay behind the light prose and, to me, the seemingly over-optimistic view of human being and human interactions. That said, I had to face the fact that numerous intelligent individuals, several of whose thinking I admired immensely, were strongly committed to this model. There must, I thought, be more to it than I am extracting from this reading. So I began to read more and to discuss it with numerous individuals, including the then director of the Greenleaf Centre. As I did this, I began both to deepen my understanding of Greenleaf and what was important about his writings. Simultaneously, I also clarified my discomforts and what concerned me.

Servant Leadership – some clarity

In many ways “Servant Leadership” is a really bad name for a tremendously powerful leadership concept. While there is power in the paradoxical linkage of the two seemingly irreconcilable terms, the name also can be seriously limiting. The word “servant” can raise numerous eyebrows among many...

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† The most common version of the essay, which first appeared in 1970, is in pamphlet form published by the Greenleaf Centre for Servant Leadership (see Greenleaf, 1991).
women and in communities of colour, particularly given the historical reality of slavery and the extended
tradition of having African-Americans as servants. Additionally, for women the word can call forth too
many gendered stereotypes of “women’s work,” or serving others, but without adequate or appropriate
honour, recognition, or remuneration. Arguably, the push against self-aggrandisement by leaders is a
core component of servant leadership, but it need not necessarily eliminate legitimate recognition and
for a job well-done, particularly when we are talking about groups and individuals whose activities and
services traditionally have been inadequately recognised and valued.

Another challenge has been the fact that too many interpreters of Greenleaf have fixated both on the
term “Servant Leadership” and numerous illustrations drawn from Greenleaf’s vestigial Methodism and
active Quakerism to turn “Servant Leadership” into an expressly Christian idea. In the United States
this is particularly strong in certain evangelical circles where the idea of Jesus as the Servant-Leader
par excellence becomes the basis for teaching and discussing servant leadership. There are those
who continue to try and force Servant Leadership into a procrustean bed of Christianity, seeing Jesus
as not A, but THE preeminent model of a servant leader. Additionally, within the text are subtle, but
quite noticeable disparagements not only of leaders within the Hebrew religious texts, several of which
are blatantly anti-Judaic if not borderline anti-Semitic. This occurs despite the fact that a fairly unbiased
eye could readily see Moses as an exemplar of Servant Leadership. The following examples are
illustrative:

- his intervention to save an alien from abuse;
- his conscious and intentional act to identify with the least advantaged in society;
- his humility at the beginning of his call;
- his continual defence of the Israelites despite their failings.

Even where he was forced to discipline the people, he first tries to convince of them of their errors
before they are “fired” (some of them quite literally). Other followers of Greenleaf, like true epigones
everywhere, have taken his dynamic insights and have hardened them into immutable truths rather
than concepts to be deepened and elaborated upon as we live into and through them. Those who
have done so have done a tremendous disservice to the man and his ideas. Many individuals whose
work and writings would be sympathetic to the cause often avoid using the term. (A fact that needs
must be considered carefully when seeking relevant material. There is much out there that does not
go under the name of servant leadership.) Additionally, it has hindered, to my mind, the type of empirical
work necessary to examine its successfulness, its strengths, and even its weaknesses (see for
example, Covey, 1989; Senge, 1990; Wheatley, 1999).

Despite these concerns, as I read more deeply and reflected on the basic claims of servant leadership,
whether one sees these in Greenleaf’s Eight Guiding Principles and Larry Spears’ Ten Characteristics,
I became convinced that they reflected a strong grounding in lived human reality. They essentially
captured things we all know intuitively—namely that we work better and harder for those who care about
us, when we trust someone we are more likely to do what they ask and even command, and when
people are enabled to grow and develop their knowledges and strengths they do their work better and,
perhaps more importantly, do better work. This should not be surprising. Everyone knows the
individuals for whom she or he gladly would put out the greatest commitment and do the hardest work.
Overwhelmingly these are individuals who actually care for us and for whom we, in return, care.
Additionally, we know the instances when we do the best work, indeed where work does not seem like

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2 While the examples could be multiplied, an illustrative example can be seen by visiting the following web page
http://christian-leadership.org/jesus-the-role-model-for-christian-leaders/

3 A direct riposte to those elements in Greenleaf disparaging Judaism may be seen in a volume recently published
by the former Chief Rabbi of the United Kingdom, Rabbi Lord Jonathan Sacks (see Sacks, 2015). This volume is
a collection of his commentaries on the weekly Torah (Bible) portion. He uses the story in the text to demonstrate
what constitutes good leadership, which, for him, is synonymous with servant leadership, which he references
regularly.

4 See Larry Spears, “Character and Servant Leadership: Ten Characteristics of Effective, Caring Leaders.”
http://www.regent.edu/acad/global/publications/jvl/vol1_iss1/Spears_Final.pdf
work at all, time disappears, and we become, if not happy, at least unbelievably content (Csikszentmihaly, 2008).

Finally, I also was struck by the normative dimension of Servant Leadership, not only the normative dimension that Greenleaf felt ought to be operating within an institution but serious normative questions about any institution’s very mission and its existence. The explicit emphasis on substantive rationality provided by this normative dimension presents a challenge to the instrumental rationality that drives so much contemporary thinking these days, exemplified by the emphasis on efficiency. Greenleaf, at his best, challenges the priority we give to efficiency, to instrumental rationality. He invites us to go beyond how we do our work to ask the question of whether the work even ought to be done. He invites us to an exercise of our normative rationality, when he writes (Greenleaf, 1991: 15): “what is the effect on the least privileged in society; will they benefit, or, at least, will they not be further deprived?” He asks us to reflect on the whether what we do actually produces the good. Over the years I have become more committed to the value and significance of servant leadership, even if not wholly reconciled to the term.

Servant Leadership in Higher Education

Through teaching about it and trying to develop it, I increasingly saw how the bases of servant leadership meshed well not only with how I understood what it meant to be a teacher, but with my views of higher education. If we are to believe the pundits and the policymakers, higher education today is in a crisis. Now, arguably, higher education always has been in a crisis—the execution of Socrates, the closing of the Academy in 529 c.e. by Justinian, the destruction of the library of Alexandria, destruction and plundering of monasteries by the Northmen and other barbarians. Not to mention the attacks it has suffered in the modern world by our own ideological driven vandals be they Nazis, Stalinists, or Maoist cultural revolutionists.

In all likelihood there was no golden age, or that it always has been a decline from the golden age. The time we live in is the kali yuga but it always has been the kali yuga. We always have been exiled from Eden, but we remember it the way we had hoped it was. That this sense of crisis always has been there one need only remember the words of Thorstein Veblen from 1918 when he wrote: Pushed by this popular prejudice, and themselves drifting under compulsion of the same prevalent bias, even the seasoned scholars and scientists - Matthew Arnold’s “Remnant” – have taken to heart this question of the use of the higher learning in the pursuit of gain. Of course, it has no such use, and the many shrewdly designed solutions of the conundrum have necessarily run out in a string of sophistical dialectics. The place of disinterested knowledge in modern civilization is neither that of means to private gain, nor that of an intermediate step in “the roundabout process of the production of goods” (see Veblen, 1993: 146). As an aside Veblen also described the typical university administrator as some sort of “itinerant dispensary of salutary verbiage.” Buffeted by increasing demand and rising cost. Derided by many for its irrelevance to the modern world. Maligned for its scurrying after the hippest new theory, higher education seems to have lost its way. While, unlike many doomsayers, I do not believe that higher education as we have known it for the past five to six decades is on life support, I am convinced that it has been seriously injured and definitely is in need of rehabilitation and meta-physical therapy. It pre-eminently requires a turn to the basic understandings and principles of servant leadership in order to give it a focus and a sense of purpose that is both defensible and valuable.

Despite my flippancy about higher education always having been in a crisis, I do fear, perhaps, that the current threats it face potentially are more dangerous than previous ones. This fear emerges from the reality that these threats are internal. Higher education today, speaking primarily, but not solely, for the Anglo-American world, has lost its way, has lost its heart. It does not know its purpose and all attempts at defence are bound to fail as a result. A serious and deep incorporation of servant leadership in higher education can address that lack of purpose, by returning it to its historical and rightful role in the formation or development of individuals and to an emphasis on cultivating in all of its members a deep and reflective sense of duty to the public good. Namely, to take the language of the Eight Guiding Principles, through building trusting relationships and community, higher education creates an environment that enables personal growth, nurtures the human spirit, and transforms individuals by creating commitment to a life of service.

Today colleges and universities must push back mightily against the claim that education is an instrumentality, that its sole value is utility. Training teaches you how to make a living, education
teaches you how to live. True education is designed to shape and form and individual, it is about formation. As a result, it implicates teaching in tremendous ways. It involves guidance, shaping, forming, constructing. In such a view the teacher is inherently a mentor. Additionally, it requires trust on the part of the learner, the student. The student must be convinced that the teacher has the student’s good and well-being. This trust, however, must be earned and deserved. Such guidance, however, is only possible to the extent to which the guide has a sense of where a person is to go. The teacher has to have a model for how a person ought to be and ought to live. The failure to provide an answer to these questions with any solidarity lies at the heart of the crisis of contemporary higher education. Absent such an answer education consists of situation where individuals are doing nothing more than casting false pearls before real swine. It was, however, not always thus.

Whether the Greek paideia, Arabic adab, or German bildung there is a long history of seeing the purpose of education as linked with the formation of the individual who manifested a certain way of being and acting in the world. The question we should ponder is what kind of individual are we interested in forming or perhaps more precisely, what is the role of professors in the formation of students, at what level or levels must or ought we aim, at what levels can we aim, and at what level would it be inappropriate? I will argue that Servant Leadership allows us to recover in a historically appropriate ways the ideals of paideia, adab, and bildung. It emphasises that our job as educators is to play a role in shaping human beings who not only have value in this world but who have value for this world. Education as formation is not about training, it is about the shaping and developing of a human being. It involves teaching, mentoring, and expectations. It states that there are some ways of being in the world that are preferable to, better than, higher than other ways of being in the world. It first of all has a doctrine of human being that is not merely instrumental, but that is normative. It pushes against the cultural norms that structure human value around money. It proclaims that a person’s worth is not co-extensive with how much money she or he has or gets. A person’s value to the world is in how she comports herself, it is in what she does and how she does it. It manifests itself in her interactions with others, particularly those who cannot provide her with any benefits.

It is about shaping and forming ethical individuals who are committed to doing the right thing, who have the tools to effect it, and also have the epistemic humility to acknowledge the possibility that their judgements could be flawed. Education is, or ought to be, about building characters who have the courage to recognise that most of human life involves acting out of imperfect information with imperfect options and the courage to re-evaluate their commitments in the light of new knowledge and to change appropriately.

The Summer Internship Program in Servant Leadership

While I think this needs and ought to be the core for every person who perceives herself or himself as a teacher (and everyone in higher education ought to do that), I would like to spend the remainder of this essay detailing how my colleagues and I strive to do it in one component of my program—the Servant Leader Summer Internship Program. First, let me share some details about the program. It is a stipended internship program. Students are paid for their work. The goal here is to eliminate the inequities inherent in unfunded internship. Given the increasing importance of internships to students’ careers unfunded internships place economically disadvantaged students at an additional disadvantage, by punishing them for the inability to undertake an unfunded internship. The students are placed in nongovernmental organizations, governmental agencies, and socially responsible businesses in the region. These organizations have submitted position descriptions and it is on the bases of these that the students apply for the program. Students are selected based on their experiences and records as well as on two essays they write for the program.

While a variety of criteria come into play, three ought to be mentioned here. First, students have to have enough knowledge and experience to be of use and value to the organization. Second, the student has to be in a position where she or he will get something out of the program. Acceptance into the program is not an award for success, it is an invitation into a learning community and the student has to be in a position where she or he is both willing to learn and has the need to learn what we offer. Finally, we look for students capable not only of working with others but also of learning with (and from) others. This is a key element in the program. The students come with radically different life-experiences. Some may be returning Peace Corps volunteers with three to four years’ experience working internationally, others have never worked in their lives. This variation provides an opportunity for numerous conversations and questions, the offering of possible solutions and ways of addressing...
challenges. Additionally, it provides participants with a chance to discover that they can learn from lots of different sources. The recognition of the wisdom of the group is a lesson that I want the students to learn and internalise.

They gain this lesson through the classroom component of the program. They do not receive any credit for the classroom component, so they do not pay tuition. We meet weekly on Fridays for eight weeks of the program for about four and a half hours. During the first ninety minutes of that time the students are broken into small groups where they basically are led through a loosely structured debriefing of their week. Students begin by discussing their work, identifying challenges, and highlighting successes. During this time they also may get questions from the group, pushed gently to explain why they handled a situation in the manner in which they did, or even challenged as to why they did not address a particular challenge. Simultaneously, they receive approbation for handling a difficult situation with thoughtfulness and aplomb often when they did not even see how complex the situation they handled was.

This debrief is key because it works to process the experiences and to help the students abstract and identify what they actually are learning during their time at work. These goals also are served by the students’ writing assignments, including weekly reports/reflections on their experiences each week. In those reflections students are encouraged to write not only (or even primarily) about the work they are doing, but are to use them as opportunities for reflection on that work, on organizational politics, management challenges, and even why their organization needs to exist. The goal is to enable, if not encourage, the students to engage more deeply with their experiences, to help them discern the lessons about human interaction, ethics, and leadership that can be learned from the daily experiences of work and to live imaginatively into the experience of positional authority by regularly asking the questions of why did the supervisor make that decision, what were the constraints under which she may have been operating to lead to it, what were the assumptions, and what would I have done in a similar situation? This last point is key, because to a great extent the entire program is centred on getting the students to struggle with the question, how do I see myself as responsible for an organization? The question, framed this way, forces the students to think beyond themselves in very important ways. This brings us to the first intellectual assumption in the process, namely that servant leadership can be taught. This assumption is driven by the view that servant leadership is comprised of a set of practices that one can develop. Arguably one may not necessarily become a master of all of them, but that point is irrelevant due to the fact that the individual who is a servant leader has sufficient humility and self-awareness to identify and acknowledge her or his weaknesses. She or he can then engage co-workers, advisors, colleagues who are strong on those areas where she or he may be weak. The ability to learn servant leadership, to develop its practices is limited by only one thing, namely one’s willingness to be one. It conditioned by the individual’s willingness to take the time and effort to develop and employ the practices. This, in and of itself, is most challenging, for it requires an individual to acknowledge weaknesses and to strive to overcome them. Regardless of whether one takes Greenleaf’s Eight Guiding Principles (Trusting Relationships; Enabling Environments; Personal Growth; Nurturing Spirit; Service; Transformation; Creating Commitment; Community-Building) or Spears’ Ten Characteristics (listening, empathy, healing, awareness, persuasion, conceptualization, foresight, stewardship, commitment to the growth of people, building community) as a starting point, upon reflection it becomes clear that these can be understood as practices (listening, persuasion, empathy) or as ends comprised of practices (trusting relationships, creating commitment, commitment to the growth of people). As practices they can be learned.

The fact that some of these practices may be difficult to cultivate, empathy perhaps for some, and that some consist of complicated sets of practices, e.g. foresight, does not undermine the claim. Arguably anyone in the role of positional authority already has developed a long list of complicated practices and skills. Why should we think that the skills necessary to manage people should be any easier to develop than those necessary to manage things? The issue of difficulty is elided by the development of phronesis, practical wisdom. At its simplest, practical wisdom, phronesis, is the wisdom we develop through the process of interaction with the world and with others (see Aristotle’s The Nicomachean Ethics, Irwin, 1999). The challenge is that the lessons learned, knowledge gained, from those interactions may be erroneous. As a simple example, one may determine from one’s interactions with a particular individual that that individual is very nice and accommodating and one cannot understand why others constantly speak of him as difficult and unpleasant. Given these competing facts, one may decide that the others are wrong, maybe unfairly biased against the individual, etc. This may be a correct conclusion. On the other hand, the person might be well-behaved toward you but not because
he is well disposed to you. He may be acting in that manner solely because of what he thinks he can get out of the relationship and when he learns, perhaps, that you lack the power or authority he thought you have, he becomes cold and indifferent to you. In this instance a good use of practical wisdom teaches that well-behaved does not mean well-disposed and that one needs to be aware of that fact. A poor use of practical wisdom will lead one either to draw no lesson from the experience or the lesson that everyone is only out for gain and that one must be suspicious of everyone's motives and their behaviours.

While this is a disturbingly trite example, it does illustrate that development of practical wisdom, as a skill or practice, is not straightforward. It requires the ability to acquire the facts and to analyse them appropriately in a way that leads one to a defensible conclusion. What makes it a practice, however, is that one's conclusion are in relative flux due to the fact that one's engagement with the world and others consists of multiple iterations. One plays or, perhaps more precisely, replays the game of life everyday. These multiple iterations allow us regularly, if not continually to refine our conclusions, to deepen our wisdom about how the world works and how people act. While this is nothing more than an expression of how we learn many things in life. Abstracting that activity, naming it, and discussing with students how to undertake the process more intentionally is a key component to helping them become both better decision-makers, but also better leaders.

This recognition that the development of practical wisdom is an iterative process, requires as well a deeply cultivated sense of both personal and epistemic humility. By this I mean, first, an awareness that one does not know everything and is not the fount of all knowledge and a willingness to act accordingly. Certainly, as a professional and, often, as one in positional authority one ought to know plenty. One cannot, however, know everything, and more importantly one must recognise that in many instances others know more. An intelligent and successful leader uses this fact as the bases for ensuring organizational success rather than as a challenge to her or his ego or authority. Just as the conductor of a symphony need not (and cannot be) the master of every instrument and in her conducting must attend to the various musicians, as well as the concertmaster as to the strengths and limitations of each instrument. That said, the conductor remains responsible for the overall sound of the orchestra and for the results. Humility, rather than limiting the conductor, becomes key to producing a successful outcome.

Humility, however, needs to be manifest not only personally but epistemically. One must be willing to recognise that not only is one’s knowledge limited, but so is one’s ability to make decisions and judgements. This is not an argument for relativism. One needs to and ought to make decisions and judgements, both moral and otherwise. It is, however, a call for internalizing the fact that many, if not most, of our judgements ought to be considered tentative and conditional. They are conditioned and, thereby, limited by our knowledge of the facts, our ability to analyse the facts, and our views of what the consequences might be. All of these, however, are subject to change. We may lack relevant facts. Something we thought was a pertinent fact may turn out to have been a lie or an irrelevancy. We may have interpreted or analysed the facts poorly or incorrectly. Perhaps, most disconcertingly the decision we made, and the actions we took pursuant to that decision, may have had markedly negative unintended consequences. We must be committed to entertaining the proposition that even though at a given time we are convinced that we are right, we actually could be wrong. Such a position is neither a call for relativism nor a statement that one be irresolute. It simply takes seriously our human limitations and follows consistently from the commitment to developing practical wisdom. One can only improve if one takes seriously the fact that one can be wrong and is willing to learn from situations where one erred, at whatever level.

This struggle to improve both who one is and what one does is enhanced by the commitment to normative rationality that lies at the heart of the program and its commitments. Like much of the program and servant leadership as a whole this is countercultural. It pushes against the subjectivism that permeates contemporary culture. It challenges the emphasis on feelings and individual interpretation that distort our ability to argue about common or public goods or even about facts. Additionally, it strives to force a serious conversation about whether there are some ways of being in the world that are better than others, including some ways of organizing and structuring our lives together through policies. The commitment to normative rationality also presents a challenge to the dominance of instrumental rationality that dominates political and economic discourse. It argues that the language of instrumentality, of efficiency can only tell us ow to do something better. It cannot inform us as to whether it ought to be done at all. It is the logic of the machine that performs its task.
unthinkingly. If you focus on efficiency alone, it matters not whether your trains carry food to starving persons or persons to death camps.

All of the work is strengthened by taking place amongst a group of individuals who are willing to engage in a shared undertaking, namely to struggle together over questions of the good. This does not happen readily. Arguably, some of this is eased by the mere fact of self-selection, but not completely. Many students apply to the program merely because of the stipends others because it provides an opportunity to develop career skills. The faculty (teaching staff) have the responsibility of moving these students into a community. The first step in doing this is developing trust within and among the group. As much as I hate to state it this way, it is about creating a safe space for the students to engage with each other. It is not one of those safe spaces where individuals are protected from different ideas, claims, and views. It is a safe space in which to be challenged not to be free from challenges. As one of my students phrased it:

“Dr. Queen’s teaching style is unlike any I have encountered before. He has an in your face kind of way of speaking, but you know he is challenging everything you believed in a way that is not offensive, but makes you want to rise to the challenge and prove him wrong…”

It works because students are convinced that we all are engaged in a shared intellectual (and political, and social) journey. This journey is marked by a shared commitment to determining the good and striving to effect it. This point returns us to where this article began.

Conclusions & Implications

From the discussions thus far, it is persuasive to sum up that higher education, as education and not training, can only be redeemed if it returns to a deeper understanding of its role in the formation and shaping individuals, particularly in the ability to produce and adjudicate between competing claims about the good, which is about ideas. In that vein I conclude with this quotation by John Maynard Keynes:

“The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct Economist. . . . It is ideas . . . which are dangerous for good or evil” (Keynes, 1936: 383).

Ultimately it is my hope that the ideas behind the development for this maiden issue may well set the pace for the enactment of servant leadership in higher education.

References


**Biography**

Edward Queen directs the D. Abbott Turner Program in Ethics and Servant Leadership and serves as Coordinator of Undergraduate Programs at Emory University's Centre for Ethics. In this role he works to shape and form future generations of community leaders. In 2013 the program was recognised by the journal *Character Clearinghouse* as an exemplary program in character formation. As a specialist in issues related to leadership development, professional and management ethics, religious and ethnic conflict, and civil society, Dr. Queen has also advised numerous organizations on leadership and ethical issues including the Pew Charitable Trusts, Belk, AECOM, Ethisphere, CertusHoldings, Inc., Coca Cola, USAID, the South-eastern Council of Foundations, and the Corporation for National and Community Service. He is a frequent contributor to the media and is regularly asked by media outlets to comment on ethical issues in government, non-profits, law, and business. Additionally, he regularly comments on films for the Atlanta Jewish Film Festival.

Dr. Queen has written, co-authored, and edited numerous books, including *Serving Those In Need: A Handbook for Managing Faith-Based Human Services Organizations* (2000), *Philanthropy in the World’s Traditions* (1998), and *The Encyclopaedia of American Religious History* (1992, rev. ed. 2002, 3rd revised Edition, 2009). In 2012 Queen was awarded The Laura Jones Hardman Award for Excellence in Service to the Emory Community. This award is bestowed upon those who serve “as role-models to students and others by offering an unselfish, time-consuming, and appreciable service to the university community.” He also has been recognised three times by Emory University’s Phi Beta Kappa chapter as a professor “who has encouraged and helped students to excel, and who exemplifies intellectual rigor.”
ECDL-Enterprise Education Alignment: Insights from a London University

Cedric Nosa and Nnamdi O. Madichie

Abstract

This study presents the findings of a longitudinal study on the deployment of the electronic computer driving licence (ECDL) in a London University of the space of five years (2005-2010). As an enterprise development tool, ECDL has been proven to contribute to the employability of students. Indeed ECDL not only improves learners' understanding of computers, but also promotes efficient use of software for academic learning. In the case of this London University such enhancement has been accorded an additional thrust – i.e. enterprise education development. It is obvious that students sign up to ECDL for variety of reasons (including boosting their CVs; skills development; and entrepreneurial development). It is arguable, therefore, that ECDL certification does prepare students for life after university education. ECDL at the London University has gone full circle, from an initially subscription of about 70 students at the outset (i.e. financially self-funded initiative) to a fully funded training and development activity with over 2000 students enrolled within five years of its launch. It is posited that this exposition of good practice would be of value to key stakeholders in education notably – students, universities and employers.

Keywords: Enterprise education; European Computer Driving Licence (ECDL); London University

Introduction

In this paper we attempt to showcase the development of the European Computer Driving Licence (ECDL) as an enterprise development tool in the context of a London University. We also seek to highlight how ECDL can enhance the enterprise education that most higher education institutions (HEIs) crave. In so-doing the study highlights the trend, from a single case study of a London-based university, of ECDL embeddedness in the curriculum and its implications for enterprise education. Following this opening section, an attempt is made at reviewing select scholarly papers on the concept of enterprise education. This is closely followed by a synthesis that provides the grounds for our study – i.e. that ECDL can, and does contribute its quota to enterprise education. Indeed we observe and report that students' employability can be enhanced and/ or facilitated by an institutionally applied ECDL course/ module as part of the curriculum. Indeed this study further develops the frontiers of an earlier study on the same institution and presented at this same conference three years ago (see Gbadamosi and Madichie, 2010).

Literature Review

Enterprise education is a broad-based tool that has benefitted from numerous definitions spanning a number of years (see for example, Hytti and O’Gorman, 2004; Rae, 2007; Jones and Iredale, 2010; Draycott and Rae, 2011). As part of the brief review of the literature, only key elements of the aforementioned studies would be considered. First, these themes would be presented, using verbatim quotes as appropriate. Second, an attempt would be made to see how the themes apply to the ongoing discourse on enterprise education – especially in the light of mainstreaming ECDL for enterprise education, as was the case at the University of East London.

Starting with the first of the aforementioned studies, in their exploration of enterprise education, Hytti and O’Gorman (2004) developed a conceptual schema used to analyse 50 enterprise programmes across four European countries (Austria, Finland, Ireland and the United Kingdom). It is useful that part of the study’s coverage included the United Kingdom and even more so that these authors highlighted the need for institutional support for education and training (see p. 11).
Secondly, Rae's (2007) paper “builds on the early experiences of connecting graduate enterprise and employability in the UK and proposes that further research is required as the field develops in experience and complexity.” This is another key area when it comes to enterprise education – i.e. employability. Thirdly, Jones and Iredale (2010) sought “to suggest that the most appropriate way to construe the concept of enterprise education is from a pedagogical viewpoint.” According to these authors “enterprise education should not be equated solely with business, as it is a broader, deeper and richer concept. The theoretical import of the study is in part a plea for a more rigorous, practically informed analysis of the different strands (pedagogy, entrepreneurship, citizenship and civic responsibility) that make up enterprise education (see Nosa and Madichie, 2013). Finally, Draycott and Rae (2011: 127) undertook a “critical review of competency frameworks introduced in England to assist with enterprise education primarily for the 14-19 age group [comparing] their educational purpose and rationale (why?), their content (what skills and knowledge they include), and the approaches to teaching, learning and assessment they recommend (how?).” Interesting elements here include why, what and how – we should be concerned with enterprise education. For the purpose of the current study, the “what” makes for a curious exploration – especially as ECDL is brought into the discourse. Questions such as ‘why’ have already been covered in the extant literature. Furthermore, the “how” element is equally significant as we seek to share the experience of a London University – developing entrepreneurial learning following in the tradition of Madichie and Gbadamosi (2010) in their case study of the development of the SME Marketing course at the same institution.

Embedding ECDL at the London University

Recalling that we seek to highlight the “what” and “how” observed in the study by Draycott and Rae (2011), we start with what ECDL entails. In terms of the what, ECDL has been reported as a tripartite endeavour capturing three key elements: (i) essentials; (ii) user fundamentals; and (iii) IT (information technology) security, this paper explores the potential of linking this triad to the entrepreneurial mindset of users (both existing and potential) drawing upon the experience at a London University. It is obvious that students sign up to ECDL for variety of reasons (including boosting their CVs; skills development; and entrepreneurial development). It is arguable, therefore, that ECDL certification does prepare students for life after university education. When it comes to the question of how, ECDL was initially run as part of the skills unit of the Learning Resource Centre of the London University – as an optional student-support service. However, with the passage of time, and with an increase in demand from students, it became a regular course/ module with its distinct sets of learning objectives and outcomes.

What this means is that ECDL became embedded into the curriculum cutting across Schools especially the School of Health Sciences where the demand was more popular and later extended to other Schools such as Business, Computing and Architecture amongst others. This meant that the student number more than quadrupled in the space of 4-5 years requiring additional staff for tutoring purposes. ECDL has now become a course/ module in its own right. This transformation demonstrates that the pedagogical elements (recall the themes from Jones and Iredale, 2010) have been leveraged across disciplines and have also been able to prepare students for life after study. Indeed, as was observed in the case of SME Marketing (Madichie and Gbadamosi, 2010): “One of the key findings in this paper is that, as a result of the development of SME Marketing at UEL, many of the students that have been through the course have developed or reinforced their entrepreneurial engagements.” These authors also highlighted a rich cocktail of pedagogy and entrepreneurship, which we observe in the outcome of ECDL thus, “We perceive that the pedagogy embedded in the curriculum may have an indirect consequence of business start-ups exhibited by these students ...” (see Madichie and Gbadamosi, 2010).

Indeed Madichie and Gbadamosi (2010) once observed, and reported that “while noting the remarkable increase in the enrolment figures (an indication of the growing interest in this subject) we also observe the pastoral support epitomised by the former students’ business start-ups [...] narrative feedback received tends to suggest that the respondents have not only benefitted from the module, but also found it inspiring and motivating in terms of the skills development embedded in module’s total package.” Coincidentally, ECDL has been a central point of the pastoral support and skills development alluded to, and which transcend the mere putting together a business plan. This is consistent with the observations of Jones and Iredale (2010), which sought:
“To suggest that the most appropriate way to construe the concept of enterprise education is from a pedagogical viewpoint. Enterprise education as pedagogy is argued to be the most appropriate way to think about the concept and serves to demarcate it from entrepreneurship education, which is very much about business start-up and the new venture creation process.”

In the next section we discuss some of our findings reflexively (see McGlinn, 2009; McIntosh, 2010).

Discussion of Findings

Following on from the aforementioned pedagogical emphasis, Jones and Iredale went through the trouble of providing a historical backdrop on the development of enterprise education at part of the English curriculum. According to them (Jones and Iredale, 2010, p. 7):

“In Britain the last 30 years has seen an increased focus on the introduction of enterprise education to the curriculum throughout all phases of education, in part to help address the need for a trained, skilled workforce able to operate in a more flexible labour market where self-employment, starting a business or working for a small to medium-sized enterprise (SME) are encouraged. This focus has usually been in the form of a recommendation, but most recently it has been introduced as a compulsory element at Key Stage 4 of the National Curriculum in England.”

Of particular relevance to the discourse on ECDL as an enterprise educational tool, Jones and Iredale (2010) opined that their study sought to clarify a problem, which was sorting out the mess between “enterprise” vis-à-vis entrepreneurship education. They consequently, contested that enterprise education akin to “a chimera that can mean all things to all people. Enterprise and entrepreneurship are often used interchangeably and this causes much confusion” (p. 10). Citing the recommendations of the Office for Standards in Education (Ofsted, 2004) that “schools should establish a clear definition that was understood by all involved” and suggests “enterprise education consists of enterprise capability supported by better financial capability and economic and business understanding” (Ofsted, 2004; Teachernet, 2008). Likewise Atherton (2004) once recognised the need to unbundle the terms in order to identify the similarities and differences of purpose between them. This is addition to a study by Price (2004, p. 4), which was specifically picked out by Jones and Iredale (2010) as perhaps, offering a succinct distinction between enterprise, entrepreneurship and intrapreneurship:

“Enterprise is an inclusive concept, which provides both the context in which subject disciplines can be explored, as well as an approach, through skill development, which can be taken to the exploration and discovery of a discipline. In these respects, it can provide a challenging environment within which to explore a variety of teaching areas (the small business context) as well as provide a dimension to learning, that of developing the skills of being enterprising, which provide students with an attitude towards learning, which rewards and supports innovation, change and development.”

While enterprise has been well documented to support the recognition of new market opportunities as well as the development of opportunity to change and develop at the individual, business and industry levels – ranging from the exploration of new ideas and developments from a corporate perspective (as intrapreneurship) to the creation of new ventures, social programmes and the exploration of new opportunities (Price, 2004, p. 4) – it does have other applications. Indeed enterprise education, as identified by Jones and Iredale (2010), aims to maximise opportunities for the development of enterprising skills, behaviours and attributes in young people in the expectation that these will be utilised, deployed and developed at some future point whatever their career choice might be (a key objective of ECDL at the London University). This is distinct from the pursuit and/ or reliance on entrepreneurship education, which is aimed more at encouraging people to start a business (perhaps more along the launch of SME Marketing highlighted in Madichie and Gbadamosi, 2010). In the light of the above, Jones and Iredale (2010, p. 11) teased out the different foci and emphasis given to enterprise and entrepreneurship education:

“Entrepreneurship education focuses primarily on the needs of the entrepreneur, whereas enterprise education addresses the requirements of a wider range of stakeholders,
including consumers and the community. However, the key difference between the two terms is that the primary focus of entrepreneurship education is on starting, growing and managing a business, whereas the primary focus of enterprise education is on the acquisition and development of personal skills, abilities and attributes that can be used in different contexts and throughout the life course.”

According to these authors argued that while the primary focus of entrepreneurship education was on (see Nosa and Madichie, 2013):

- How to start a business including the key processes of business start-up;
- How to plan and launch a new business venture;
- Enhancing the necessary skills and behaviours needed to run a business;
- Deployment of entrepreneurial skills and knowledge in a business context;
- Imminent use of the knowledge and skills needed to start a business; and
- Self-employment.

The primary focus of enterprise education is on:

- Active learning enterprise education pedagogy;
- Knowledge needed to function effectively as a citizen, consumer, employee or self-employed person in a flexible market economy;
- Development of personal skills, behaviours and attributes for use in a variety of contexts;
- The person as an enterprising individual – in the community, at home, in the workplace or as an entrepreneur;
- Use of enterprising skills, behaviours and attributes throughout the life course; and
- How a business, particularly a small business works.

Overall, the use of enterprise education pedagogy can be used across subject areas and throughout different phases of education. In contrast, entrepreneurship education is primarily delivered through subjects like business or economic studies at secondary and further education levels or via business school modules at university level. Indeed and according to Jones and Iredale (2010, p. 12), “using creative, action and experiential learning pedagogies means that the enterprise education approach can be applied in different teaching and learning contexts, through different subject areas (see the example of biology enterprise in Hartshorn and Hannon, 2005) to best meet different pupils/ students’ needs.” In addition to the detailed analysis of Jones and Iredale (2010) above, Draycott and Rae (2011: 137) in their discussion, posed a similar question: What does “enterprise” mean in the context of 14-19 education? The central argument was that enterprise has been “hijacked” by schools as a convenient vehicle for them to evidence a range of “soft” skills which they cannot easily do in other ways (Nosa and Madichie, 2013).

As part of their observation, Draycott and Rae (2011) opined that in some schools it is even the practice for “less academic” or “challenging” students to be directed towards enterprise, whilst academic “high fliers” are steered towards attainment of qualifications which improve school league-table performance. While we would hope that students who may be marginalised by their educational experiences may be energised by enterprising learning, it does seem wrong to steer “the more able” away from enterprise, for, as argued below, they are as likely to need some entrepreneurial orientation for the development of their career plans. It seems that the rationale and philosophy of enterprise is poorly articulated and understood in the educational policy literature – where questions have been raised as to whether (i) it
is free-market political ideology; (ii) the development of soft skills or (iii) the development of employable young people.

As an alternative, Draycott and Rae (2011: 138) argued that Enterprise should be “about developing a mind-set, goals (self-efficacy) and skills (personal capabilities) to equip young people for their futures.” Enterprising learning is the process of learning in enterprising ways as well as becoming enterprising. It is “conative” and “affective” as well as “cognitive” (see for example, Gibb, 2008), but education is often most comfortable in the safety of cognitive learning. Indeed Draycott and Rae (2011:138) viewed the definition of enterprise, in the context of secondary education (and beyond), to fall under three broad classifications – personal, situational, and economic.

First, in the “personal” context, these authors argued that the development of self-knowledge and self-efficacy to be able to investigate, develop and act on ideas and opportunities. Second, in the “situational” context, they argued that being enterprising is contingent on subjects and situations, hence learning and acting in enterprising ways will be different in, for example, performing arts, biological sciences, or mathematics. However, there is a role for enterprising learning in all of these, as there is in, or between, all subjects. Enterprise is also concerned with the practical applications of taught subjects, and can be usefully described as practical creativity, especially in situations where the term enterprise is considered too value-laden. Third, and finally, they contended that in the “economic” context, an “outcome of enterprise is the creation of new value.” The argument being that it should not be seen simply as “financial value or the generation of personal profit,” but also inclusive of social, environmental, aesthetic and intellectual value. Cumulatively all these components should also be shared – especially as learners (not just students), have to survive in an economic world and an understanding of responsible enterprise should facilitate the process further.

Conclusions and Implications

The contribution of ECDL to Entrepreneurship education has been demonstrated to be of growing significance globally. It is persuasive to argue that ECDL certification prepares students for life after university education – if nothing else matters, it does look good on the CV. Indeed employees seek graduates with some degree of computer literacy at least at the basic Microsoft Office applications. ECDL provides a gateway into the full works of this digital literacy regime. As a consequence, ECDL remains a veritable tool for the development of enterprise education. Indeed as already highlighted in the literature ECDL has the capacity of serving the function of a tripartite endeavour capturing (i) the essentials; (ii) user fundamentals; and (iii) IT security – thus prompting the need for the “Triple Bottom-line” for the development of an entrepreneurial mind-set of all users (both students and their instructors). In the particular case of this London University, ECDL has gone full circle, from an initial subscription of about 70 students at the outset (i.e. while it was a financially self-funded initiative) to a fully funded training and development tool with over 2000 users (now including both academic and non-academic staff, as well as students) within half a decade of its launch.

In this exploratory study, which is based on action research (drawing upon participant observation of students over a number of semesters) the authors posit that this exposition of good practice would be of value to key stakeholders (students, universities and employers) in education in general and higher education in particular. Overall it is obvious that students sign up to ECDL for variety of reasons – including boosting their CVs; skills development; and entrepreneurial development.

The summation in this study draws upon a range of sources and the practical personal observation at the London University investigated. It also has a range of implications for the deployment of ECDL – based on the evidence that soft computer literacy skills (afforded by ECDL) can help foster enterprise education. It is our hope that future research continues to evaluate, debate the relationships between adoption of virtual learning environments (VLE) and enterprise education and the moderating role that ECDL plays in the nurturing of the student experience.
References


Biography

Cedrick Nosa is currently Head of IT Coaching & Training Service (iCaTS) at the University of East London. He works in Liaison with both internal stakeholders & external agencies and suppliers to optimise investment in IT resources – notably with Deans and academic staff, Director of Employability, Director of Student Support Services, Head of CELT, British Computer Society and other systems / content vendors and external bodies. His main responsibilities include providing the strategic leadership for the development and delivery of IT training through innovative / multiple approaches to ensure training is available at the point of need. Cedrick is also responsible for developing, managing and leading a team of IT Trainers - Identifying and nurturing talent in skills & knowledge in emerging technologies & trends in area of ICT skills development, as well as planning for succession and progression within the team. Prior to his current position, he was Manager of the Electronic Computer Driving licence (ECDL) housed in the Learning Resource Centre of the University.

Nnamdi O. Madichie is the Director of the Centre for Research & Enterprise at the London School of Business and Management. Dr Madichie has been a Fellow of the Higher Education Academy of England & Wales since 2007 following completion of a PGCE in Learning & Teaching course at the University of East London. He has also developed, led and managed numerous modules across universities both in the UK and Overseas. His academic experience has cut across three key platforms identified by the HEA – institutional, national and international. At the institutional level, he developed the BA (Hons) Marketing course at the University of East London 2006/2007 – where he was programme leader until 2007/2008. He also served on the Research Degrees Committee dealing with the recruitment, supervision and examination of PhD students. At the national level he served as External Examiner at the University of Northampton between 2007 and 2011 – reviewing the quality of learning, teaching and assessment at the institution. He has also contributed materials for leading business and management textbooks used across UK universities – notably Marketing, Real People, Real Decisions (Solomon, 2009); Entrepreneurship Marketing: Principles and Practice of SME Marketing (Nwankwo and Gbadamosi, 2010); International Marketing Strategy (Doole and Lowe); and Strategic Marketing: Creating Competitive Advantage (West, Ford, and Ibrahim, 2015).
The Potential of Semantic Web Technologies for Student Engagement Analytics

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Abstract

This research sheds light on the use and the potential of semantic web technologies for student engagement analytics. The primary research aim is to investigate whether the implementation of Semantic Web technologies can further improve the learning analytics tools as well as the analysis of student engagement. Due to the nature of the research it has been decided to interview academic staff and educational professionals (e.g. lecturers and administrators) who shared their views and experiences on the use of student engagement tools. A total number of eight (8) participants have been interviews as a results of this study. The results show that the implementation of Semantic Web technologies can provide relevant information for learning analytics. For example, using the Learning Object Ontology (LOCO), can provide a thorough understanding of student learning process through their activities, interaction with the learning content and general behaviour within the virtual learning environment (VLE).

Keywords: Virtual Learning Environment (VLE), Learning Object Ontology, Semantic Web Technology

Introduction

Materialisation of the first personal computers in early 1980s opened a new way of learning and teaching. Computers become available in house convenience. Providing learning content on personal computer becomes accessible to everyone and facilitates learning about specific subject and develops certain skills. Emergent technologies, such as Computer Assisted Learning (CAL) and Computer-Assisted Instruction (CAI) into Course Management Systems (CMS) and Virtual Learning Environments (VLEs) are developed (Andrews and Haythornthwaite, 2007). Also, in 1989, making use of a personal computer, Tim Berners-Lee a young physicist researcher at CERN, for the first time defined a way of sharing and interconnecting different kind of data storage and user guide by using a hypertext format into a project proposal (McCracken, 2014; O’Luanaigh, 2014). In the late 1990s Tim Berners-Lee defined and used the World Wide Web such as “a universal hypertext system, once in place, will cover many areas such as document registration, on-line help, project documentation, news schemes and so on” (Berners-Lee, and Cailliau, 1990).

World Wide Web becomes an open project in 1993, when CERN decides to move the W3 under an open licence (O’Luanaigh, 2013). At this stage informational web started (Armitage, 2010). The first web was just about searching and reading data. Users being able just to read, share and interconnect different content over the web (Getting, 2007) without any interactions with it. The emergent web technologies moved the focus of educational environment evolution from personal computers to online environment. Various multimedia contents such as movies, audio files or other kind of games with educational content and text files are easy to be distributed. From early days, the web, become a medium of delivering online courses to distance learners at a lower fee (Holmberg, 2005). Furthermore, the next generation of the Web, or WEB 2.0, gets life when a web page accepts user inputs. Catching of those inputs become possible when new technologies such XML and AJAX rise on market (O’Reilly, 2007). At that time the blogs and social networks has begun (Armitage, 2010). The new technologies used, made possible the development of what is called social web (Dawson, 2007) or web of documents. The Web become accessible to everyone and provide user-friendly environment.

Those new Web technologies make online learning platforms become interactive, where students are able to provide system interaction. Now, learners are able to interact, collaborate online and co-learn through discussions and group works at no face-to-face interaction. During the time, missing of this

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5 CERN is derived from the acronym for the French "Conseil Européen pour la Recherche Nucléaire", or European Council for Nuclear Research. At CERN, the European Organization for Nuclear Research, physicists and engineers are probing the fundamental structure of the universe. Retrieved from: http://home.cern/about
face-to-face interaction rise liking of student behaviour and misunderstanding of learning engagement (Crane, 2012). Analysing online learner behaviour, at some levels, can be identified and analysed to provide a roughly idea about student engagement through learning process and provide some patterns. Analysis of those student patterns aims to improve their learning experience, support and academic performance. The focus of educational research on student engagement remains current, despite the recent Web development. While, Web 2.0 provides social tools and resources of sharing information rather than solely broadcasting (Getting, 2007), such applications lead to creating new and complex knowledge (Shang et al., 2011) stack in a form of Web of Data (Gracia et al., 2012). New technologies emerged on the market, as a development of Web2.0. Those technologies that enhance user experience and machines capabilities to analyse the content create new web generation. This new Web generation is capable of processing the content based on provided semantic content along with user content interaction, used the name of Semantic Web (Sauermann, and Cyganiak, 2008).

The web is a huge documents warehouse (Berners-Lee, 2009) that generates interactions between users and the published content. Along with the web evolution, online learning environment is adopting new technologies. In line with the adoption of the new technologies by educational institutions the following question arises: How could Semantic Web technologies be used in educational context to enhance learning analytics? The research aim is to investigate whether the implementation of Semantic Web technologies can provide additional tools of analysing the learner behaviour in e-Learning systems. The first investigation identifies the standards, guidelines and key factors that gather the best practice of providing semantic content of web applications. The second investigation identifies applications and technologies used in educational context by analysing relevant pieces of work in the field and gathering the relevant applications and earlier experimental work. Interviews are the primary data collection method for evaluating the semantic web potential, as well as for identifying the legal and ethical issues. The recommendations are made in terms of providing guidelines of web applications development in educational context based on the analysis of the collected data and its alignment with the previously published research studies on the subject of student engagement. Evolution of computer machines and the web development changed the way teaching and learning process has been delivered. From early days of those technologies, direct interactions between learners and lecturers began to drop. Today a large amount of learning content is been delivered over the internet helped by different VLEs (Holmberg, 2005).

Without any direct interaction of learners and lecturers makes difficult or almost impossible to determine if the students are engaged through learning process and to analyse the behaviour in connection with learning process over VLEs. VLEs log data provides the input for tools that analyses student behaviour on virtual environment. Over the time, along with technical development those technologies started to provide more accurate and relevant content to be analysed (Shi et al., 2013). This study focuses on identifying that Semantic Web technologies can provide higher student analytics tools or not. Moreover, assessing those technologies raises any legal and ethical issues. The study will not consider analysing any implementation and development of those technologies. Furthermore will not assess how learning content has been delivered and VLEs logs data are collected.

**Literature Review**

The aim of this research is to identify and evaluate the relevant work in relation with use and potential of Semantic Web on Learning Engagement namely on two objectives. In the first part of the literature review an overview of Semantic Web technologies takes place to identify how data is stored, published and interconnected to provide semantic meaning. The web is a huge documents warehouse. The interconnection of those documents from the web changes how refers to it (Berners-Lee, 2009). Second part of literature review investigates how student engagement can be influenced and analysed by semantic web tools. Moving to online environment such mobile, digital, and online technologies reveal amount of data that have to be stored and analysed (Ferguson, 2012; Macfadyen et al., 2014).

**Web Evolution**

The Web has long been seen as a set of interconnected HTML documents. This document network was built on Hyperlink protocols developed earlier by Ted Nelson (Berners-Lee, 2009). A number of technological developments have later enabled to facilitate information searching and accessibility. HTTP protocol and Uniform Resource Locator (URL) clear defined HTML request and identification
(Aghaei et al., 2012; McKerlich et al., 2013). While users could link to any other HTML content/documents through hyperlinks, the Web remained static and read-only for the rest of the audience (Daconta et al., 2003). As O’Reilly (2007) highlights, the Web lacked user interaction. In the later years of the Web, evolution new programming languages such as XML and AJAX have appeared. The new technologies lead to the development of the web services and web application, many of which were open source, open and community led. These changes marked the move of the Web into a new era, Web 2.0 (O’Reilly, 2007). Common to Web 2.0 were blogs, social networks, wikis, and multiplayer online game platforms, which become widely spread and popular. Similarly, in an educational context, new e-Learning environments started to e-merge (Mennin, 2008). In this environment, students were able to interact, collaborate online and co-learn through discussions and group works. The history of e-Learning development’s, platforms and technologies have always highlighted the importance of student engagement (Crane, 2012). The wide availability of e-Learning and environments lead the researchers to study student engagement patterns online with the aim of improving their learning experience, support and academic performance. The focus of educational research on student engagement remains current despite the recent developments on the Web. While Web 2.0 provided social tools and means of sharing information rather than solely broadcasting (Getting, 2007). Such applications lead to create new and complex knowledge (Shang et al., 2011) stack in a form of Web of Data (Gracia et al., 2012).

**Semantic Web**

The next stage of Web evolution provides even greater prospect for the studies of student engagement. This is commonly referred to as the Semantic Web (Benito-Osorio et al., 2013). Semantic Web it is a framework of publishing data on the Web based on semantic relations (Cabral et al., 2004). A comparisons between the Web an Semantic Web have been presented by Cardoso (2007), depicted in Figure 1 (see Cardoso, 2007). Computer understanding and relations inside the documents are the aims (Mohebbi et al., 2012) such extension of the web of documents (Sauermann and Cyganiak, 2008). Architected of Semantic Web has been presented by Tim (2001) as a multi layers structure depicted bellow by Source: Berners-Lee et al. (2001). Some criticism about semantically meaning are figured by Shirky (2003), Brooks (2002), Gardenfors (2004), and Pool (2006). Against those criticisms Semantic Web is still being analysed and researcher community continues to develop and improve technologies such as: Resource Description Framework (RDF), Resource Description Framework Schema (RDFS), Web Ontology Language (OWL) or query language as SPARQL.

![Figure 1 - Web relations (Cardoso, 2007)](image-url)
Base layer of Semantic Web architecture, URI, Universal Resources Identifiers, and Unicode, refers at how resources are identified and the encoding system being implemented (Cardoso, 2007). URI uses two main identifiers, Uniform Resource Locator (URL), and Uniform Resource Name (URN), presented in Figure 3 - URL and URN example (Cardoso, 2007). The second layer, XML, become an accepted standard of data interchanging. The XML implementation provide effortless of incorporation and intercommunication. Additionally, facilitate data and system interactions and interoperability (Daconta et al., 2003; Mohebbi et al., 2012).

At the third layer, Data interchange, The World Wide Web Consortium (W3C) recommends using Resource Description Framework (RDF) used as a data model for defining and using metadata structure (Peres et al., 2004). Therefore, RDF built on XML standards (Daconta et al., 2003). RDF data model it is a standard of creating data semantic network structure over the web. RDF metadata creates and describes relations between different sources graphical described in Figure 4 - RDF representation (Cardoso, 2007). This relationship is presented as a triplet of a subject, predicate, and object. The subject is the resource in question, represented as an URL. The predicate is an action or relation between subject and object that can be presented literals or as an URN (Daconta...
et al., 2003; Herman, 2007). The object is the target values of RDF action or relation (Hitzler et al., 2009; Pandey and Buddhadev, 2012; Sintek and Decker, 2003).

Figure 4 - RDF representation (Cardoso, 2007)

As a result of “triple” structure, RDF thought about in a relational SQL database as a three columns table compound by a subject column, a predicate column and an object column (Niemann et al., 2007; Sequeda and Miranker, 2013; Habernal and Konopík, 2013; Chekol, 2013). Rather than relational databases, usually object column stored by default different data or are specified by the predicate into ontology (Chekol, 2013). At the same time, once more as compared to relational SQL, every one of the triples for an offered topic can be represented as a row, with the topic being the primary key as well as each possible predicate being a column and the cell values represents the object (Sequeda and Miranker, 2013; Habernal and Konopík, 2013).

RDFs, RDF schema, it is an extension of RDS that allow to build data models (Cardoso, 2007). RDFs is very similar to programming languages such Java or C++. It allows users to define classes, providing properties and value fields (Mohebbi et al., 2012; Klusch, 2008; Pandey and Buddhadev, 2012). It is a data structure representation based on RDF/XML with extended applicability (Pandey and Buddhadev, 2012). Web Ontology Language (OWL), is a prearranged vocabulary based on rock-solid set up to construct a superior knowledge level of semantic in a well and unambiguous manner (Mohebbi et al., 2012). Taye (2010) analyse the Web Ontology and provide some implementation aspects. On educational context Learning Object Context Ontologies (LOCO) was developed to enhance learning object data representation, as well semantic annotation accomplishment of lessons, assessments, and communications as online interactions (Jovanovic et al., 2009). SPARQL is an RDF query language (Hitzler et al., 2009). Includes capabilities of running queries of essential and optional graphs along with their conjunctions and disjunctions (Habernal and Konopík, 2013; Garcia et al., 2012; Sequeda and Miranker, 2013). In addition, SPARQL supports extensible value screening as well RDF source graph queries. The outcomes of SPARQL queries could present as RDF charts or data sets (García et al., 2012). Logic and proof layers makes use of logical principles that enhance semantic analysis of Web content (Cardoso, 2007). Different aspects of logics and proofs theories and implementations are analysed by Kontopoulos, Bassiliades, Grigoris (2008; 2011), Eiter, et al (2008) and Bruijn (2007). Trust is the top layer of Semantic Web. This layer provides authenticity of identity and evidence of the trustworthy data and services (Camí, 2011).All those technologies work together in a way of publishing web content linked conjunctively to be understandable by humans and computers (Biser et al., 2011) across different languages (Gracia et al., 2012). Linked Data it is a semantic data framework to ensure that any kind of data are linked together. As well, provide semantic query capabilities. It is built on top of HTTP, RDF and URIs. Rather than serving human reader users, Linked Data let, those to share data in a manner of that data are machine-readable. This allows data from different sources to be attached as well as queried (Biser et al., 2011).
Linking Open Data

Such projects of W3C, Linking Open Data (LOD) implement Linked Data concepts into data published under Open Data license (Meij et al., 2011). Wikipedia, Wikibooks, Geonames, MusicBrainz, WordNet, the DBLP bibliography are a part of Open Data providers on which further LOD develop various database such as DBpedia, Geo Names, YAGO, Open Library, FOAF-Profiles (W3C, 2014; Paulheim et al., 2014). Today, institutions and organisations develop their own LOD databases (Biser et al., 2011). BBC develops its own LOD databases about music, radio and TV programs related to DBpedia to display data in BBC applications (Kobilarov et al., 2009). Further then that since 2009 governmental take place to develop Linked Data structures (Ding, 2012). Data.gov and data.gov.uk are examples of Linked Open Governmental Data (Ding et al., 2011; Shadbolt et al., 2012; Ding, 2012). On educational context, Semantic Web technologies move the Virtual Learning Environment to next level (Jeremić et al., 2013; Ruiz-Calleja, 2010). Further, redefine student engagement processes and stand on new approach, learning analytics (Drachsler et al., 2012).

Semantic Web for Learning Environments

Online learning and teaching technologies were developed alongside the evolution of the Web. Digital learning environment, known in a variety of names, such as Virtual Learning Environments (VLE), Computer-Supported Collaborative Learning (CSCL) (Stahl et al., 2006), Interactive Learning Environments (ILV), Technology-Enhanced Learning (TEL) (Ferguson, 2012), or Learning Management System (LMS), moves students and teachers onto Web-based applications such Moodle and Blackboard (Ferguson, 2012). It is viewed as a pedagogical framework for electronic environments, offering an extension or alternative to a classroom learning process (Devedzı, 2004; Wang, 2013a). Devedzı (2004) provides a detailed analysis of usability and implementations of Semantic Web technologies such RDF/XML and OWL in virtual learning environment. However, the use of semantic web technologies for student engagement remains open in his work. An overview of semantic implementations in learning processes is provided by Siadaty, Jovanović, Pata, Holocher-Ertl, Gašević, and Milikić (2011). In addition to Devedzı (2004) they analyse some aspects of student engagement in a virtual learning environment. They recommended to develop and to use educational systems helping by semantic techniques to enhance student learning process (Wang, 2013a). Lecturers require an increased number of support features from an e-learning system that offers details about student interaction with it (Pituch and Lee, 2006). Therefore, some applications attempt to solve the problem of monitoring learners and their interaction with various features and resources exhibited in e-Learning system. These features include dashboards for allowing instructors to easily monitor student engagement with learning resources, interaction among themselves and access to the virtual learning environment in general (Freeman et al., 2013; Van Leeuwen et al., 2014).

Student Engagement

In student learning encompassment, Astin (1984, p.297) provides an engagement definition as “the amount of physical and psychological energy that the students devote to the academic experience”. Today, students engagement means spending time and effort enlightened activities that reliable linked to academic work (Kuh, 2009). Web evolution, implicitly social networks, and VLE create new tools of engaging student with learning process (Wang, 2013a). Social networks are of high interest to students with their focus on personal growth and development (Hill, 2014). Evaluation of various social networks such as Facebook (Kent and Leaver, 2014; Wang, 2013b), Google+ and others (Wang, 2013b) identify that social networks facilitate data sharing and enhance student engagement. On the other hand, it is a disruptive factor of learning processes (Hill, 2014). Based on previous research, Wang (2013a) identifies that social networks are an irrelevant aspect of learning without the 3rd generation of virtual learning environments. Application of Semantic Web on student engagement is the subject of many researchers (Jeremić et al., 2013; Wang, 2013a; Hill, 2014). They suggest that if appropriate techniques and technologies are in place through VLEs, the learning process can be enhanced considerably. Collecting and analysis of data about students, however, requires further research and development for offering an efficient digital learning system (Beer et al., 2010). The adoption of VLEs has been start to include learner performance analysis. Learning content provider has to be aware about student performance, learning experience, comprehension and VLE interactions (Jeremić et al., 2013; Van Leeuwen et al., 2014). However, there is still a gap in the literature, which needs to be addressed by
evaluating the potential of existing semantic web tools and offer solutions to further improve the use of student monitoring in the VLEs.

Educational Data Mining

Standard strategies for addressing the needs of teachers have included learner examination, grade analysis as well as attrition rates. At times students’ perceptions about learning process have been collected at the end of a course for this purpose. Therefore, on VLEs traditional approach of examination and evaluation of the learning process has not been extended enough to capture nuanced aspects (data) of student learning and their learning experience in general (Sun et al., 2008). Resource allocation on online environment provides quality information about various interactions (Ferguson, 2012). Increased utilisation of remote, mobile, digital, and online technologies makes data recorded under "log" formats (Macfadyen et al., 2014). This enables discovery and monitoring of relationships between accumulated data, which are mainly concerns of Educational Data Mining (EDM) field. This field defines the mechanism for discovering and making sense of the data, emphasising the specifics of contextual data and the relationships between data objects to provide a relational framework about learning processes. EDM pays attention to automated data processing to provide learning support through educational software, identifying and personalising the learner experiences. Publishing data using Semantic Web technologies such as RDF, OWL, and SPARQL provide mining of behavioural patterns and profiles of users interacting with in online environment (Mobasher, 2007) not only possible, but also open for independent study.

Learning Analytics

Extracting and analysis the information collected through EDM techniques offers a potential to enhance learning processes by looking into online student behaviour. The development of the analytics gave birth to another recent research field - learning analytics (Siemens, 2012). Learning analytics make use of information mining and take advantage of identifying patterns in big datasets (Drachsler et al., 2012). It supports the development of pedagogy based on understanding integration in terms of learning concerns, student performances, learning experience, and comprehension (Mennin, 2008). Agudo-Peregrina (Agudo-Peregrina et al., 2014) identifies that for VLE courses simple data log analysis can provide an extended view of student performance. In courses based on combination of VLE and traditional face-to-face teaching student data log analysis can offer only a limited view, however, it will still offer a set of benefits. However, the use of Learning Analytics is in its infancy. Furthermore, there is even less research in relation to the use of Learning Analytics in line with Semantic Web technologies. This research aims to address this limitation and provides recommendations in the adoption of semantic technologies and learning analytics for improving learning experiences. In conclusion, this literature review outlines the recent developments of the Web and the Learning Technologies. Have been highlighted the recent research in online learning engagement and identified the gaps where additional research is necessary. It justified the focus of this work on the subject of Semantic Web technologies in educational context and aims to offer recommendations for effective analysis of student log data alongside the semantic web technologies for improving student learning experience. Given the lack of research in this new field, this research will be useful for educational technologists and practitioners – offering specific solutions for harnessing the power of the reviewed technologies.

Research Approach/ Design/ Methodology

The research that has been conducting evaluates the use and potential of semantic web technologies in educational context to enhance learning analytics. The research is relevant to learning providers and IT industry. This research will provide a better understanding of how Semantic Web technologies can be applied on learning process to enhance learning achievements, as well to IT developers to understand the trends and requirements of new VLEs improvements and development. This research will bring benefits for students as well, based on improvements that can be mad to get better tools of learning and content dissemination. As stated in the Terms of Reference, the main goal is to identify that Semantic Web technology can provide additional tools of analysing the learner behaviour in e-Learning systems by: providing an overview of what Semantic Web is, identifying applications and technologies used in educational context, and evaluation of those technologies base on qualitative research. Semantic Web bring along some legal and ethical issues that are identified and analysed overt this research as well. The research design is conducted by research question, which is the driving
force behind design choosing of conducted study (Maxwell, 2009). According to Creswell (2014) research design is a framework to provide a clear view about relations between different researches components such philosophical, design, and research methods.

**Figure 5 - Research Framework**

Based on how data is collected, analysed and expected results, three main research methods are identified such qualitative approach, quantitative approach, and mixed methods (Goddard and Melville, 2007). A comparison between qualitative and quantitative approach is illustrated in Table 1.

Qualitative method has been chosen because allows the subjects of study to be focused on a specific subject where they work. Using this approach can match the outcomes to research question using a qualitative design (Creswell, 2014). A quantitative approach can be applied to identify if quantitative data can provide relevant study information about the analysed topic (Flick, 2009).

<table>
<thead>
<tr>
<th></th>
<th>Qualitative method</th>
<th>Quantitative method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Describe a particular situation</td>
<td>Measure magnitude, how widespread is a practice</td>
</tr>
<tr>
<td><strong>Research question</strong></td>
<td>Contextual, Flexible</td>
<td>Fixed, Focused</td>
</tr>
<tr>
<td><strong>Reasoning type</strong></td>
<td>Induction</td>
<td>Deduction</td>
</tr>
<tr>
<td></td>
<td>Subjectivity</td>
<td>Objectivity</td>
</tr>
<tr>
<td></td>
<td>Meaning</td>
<td>Causation</td>
</tr>
<tr>
<td><strong>Data Collection</strong></td>
<td>Interview</td>
<td>Survey</td>
</tr>
<tr>
<td></td>
<td>Observation</td>
<td>Databases</td>
</tr>
<tr>
<td></td>
<td>Case study</td>
<td>Quantitative observation</td>
</tr>
<tr>
<td></td>
<td>Focus group</td>
<td></td>
</tr>
<tr>
<td><strong>Expected outcomes</strong></td>
<td>Usually not predefined, emergent research question</td>
<td>Identified in advance</td>
</tr>
<tr>
<td><strong>Analysing results</strong></td>
<td>Narrative description</td>
<td>Numerical estimation</td>
</tr>
<tr>
<td></td>
<td>Constant comparison</td>
<td>Statistical inference</td>
</tr>
<tr>
<td><strong>Results</strong></td>
<td>Explanatory and individual response</td>
<td>Aggregated in numerical summaries</td>
</tr>
<tr>
<td><strong>Data collection</strong></td>
<td>Depends by interactivities</td>
<td>Structured data</td>
</tr>
<tr>
<td><strong>Advantages</strong></td>
<td>Caching emotions, feeling and ideas</td>
<td>Easy to collect large amount of data from a multitude of people in a short time period as</td>
</tr>
</tbody>
</table>
Data Collection

The qualitative research method can make use of different methods of collecting data such as observation, case study, focus group, or interviews that provide primary data to be analysed (Flick, 2009). Looking for a suitable method of collecting data has been analysed all those methods. Observation method can help understand how a system and sub-systems is working together and provide a bigger picture of what is on place at a given time. This method is suitable to identify problems and provides ideas of improvements (Punch, 2005). Case study provides a limited result of an issue that is presented by case study without to add any other aspects outside of it. Focus group provides in depth understanding about certain concepts and ideas. Disadvantage of using focus group as a method of collecting data is presented by limited availability of study subject, that make hard to put all of them together at a given time. Interviews provide as well as focus group in depth analysis of specific research question but involve a bigger time scale of running interviews and prepare the verbatim. In contrast to focus group, interviews provide a time flexibility in meaning of that at a given time can run an interview with a single subject available (Kothari, 2004). Based on this analysis interview has been used because provides a better understanding of expected needs, demands and requirement in connection with research question. Furthermore, interviewees are aware about capabilities of Semantic Web and are explained potential implementations to enhance student engagement. The interviews provide a picture about that potential implementation of Semantic Web will provide better tools of analysing. At the same time will identify if using them raise any ethical and legal issues. The interview is structure in three main interest aspects such: Social Networks Interaction, Engagement with Educational Content and Ownership of Engagement Data.

Participants

The participants who were interviewed was focused on persons involved in teaching and learning process from different levels. The target number of interviewees was between 6 to 8 participants (see Table 2). The initial target has been met having 8 interview participants. The lectures in fields of Business, Law and Computing, as well other staffs that concern student engagement such Academic Principal Department, Student Admission and Success Department and Disability Department.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Interview Date</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shari</td>
<td>04/06/2015</td>
<td>Disability and Student Welfare Advisor</td>
</tr>
<tr>
<td>Kellie</td>
<td>04/06/2015</td>
<td>Lecturer in Law</td>
</tr>
<tr>
<td>Scott</td>
<td>04/06/2015</td>
<td>Head of Student Admission and Success</td>
</tr>
<tr>
<td>Mathew</td>
<td>05/06/2015</td>
<td>Deputy Academic Principal</td>
</tr>
<tr>
<td>Kate</td>
<td>08/06/2015</td>
<td>Senior Lecturer in Business</td>
</tr>
<tr>
<td>Mike</td>
<td>08/06/2015</td>
<td>Lecturer in IT</td>
</tr>
<tr>
<td>Randall</td>
<td>08/06/2015</td>
<td>Senior Lecturer in IT</td>
</tr>
<tr>
<td>Dave</td>
<td>15/06/2015</td>
<td>Computing &amp; Business Lecturer</td>
</tr>
</tbody>
</table>

All the interviews were done over the email to identify a convenient time for the interviewee. Those have been recorded and a verbatim was made. Ahead of running interviews, 3 pilot interviews took place to identify any issues about missing questions understanding, grammar and recording equipment, followed by revisions.
Analysis and Results

As starting point of data analysis, all the recorded interviews have been transposed into interview scripts. All of interviews have been anonymised using www.random-name-generator.info\(^6\). www.random-name-generator.info it is a dedicated to generate random names. MAXQDA\(^7\) is a software package for qualitative and mixed methods research approaches. MAXQDA helps to: organise, evaluate, code, annotate and interpret all a various types of data. The trial version, which provides full functionality, is used to analyse the data collected as part of this research. The software was used to code the collected interview transcripts and identify the patterns to shed light and explain the current views of the interviewees on the subject of this research (Maxwell, 2013). The coding process has focus on creating labels of the text areas that referring to a specific concept. Additionally all the text areas referring to the same concept have been marked with the same label (Gläser and Laudel, 2013). In addition to coding, a word frequency was performed to identify often used words by interviewee. The word frequency was analysis using the MAXQDA software; however, the visualisation for presenting the easily interpretable graphical representation of the frequency analysis was conducted using Wordle\(^8\) (an online platform that provides an opportunity to generate the Word Clouds, where the words used in the text are arranged on a canvas with the size of the individual words relevant to the frequency of their use in the interview scripts, see Powers et al., 2011). Those patterns are compared with each other and most prominent patterns are reported here. At the same time those patterns provide quantitative approaches that can identify some patterns are repeated (Schutt, 2011). A description of the process for operationalising the data as the software packages used for analysing the data and visualising the results are provided in the following sections.

Coding

Using MAXQDA software a list of codes has been identified by analysis of interview transcript. The code system was built up from the interview topics. Each interview answer is categorised with a specific code. Additionally, specific section of the answers have also been coded to enable the analysis of the similar resources across the transcripts. The Technology acceptance code has been used to identify whether any of the potential Semantic Web implementations would be accepted. Furthermore sub-coding has been completed to highlight the distinctive characteristics of the parent codes (see Figure 6 for an illustration). During the process of interview scripts analysis, additional codes have been identified and put in place.

The Analyses code denotes the sections of text where an interviewee expressed a concern about the kind of data which should the analysed. The Human Interaction code is used to highlight face-to-face discussions among individuals or across a group within an educational environment. It is also used to denote classroom interactions. The Personal Life code brings together areas of text that refer to implication of publishing private and personal information over the Web. Some of the interviewees expressed an opinion that the lecturer should retain a position of control when certain recommendations are being suggested to the learners by an automated system in the VLE. The section of the transcript, which express such opinions are coded as the Lecturer Position. Social networks often represent a digital identity of individuals. These digital identities, can at times, contain personal information that is publicly available. To address the concerns of the interviewees with regards to publishing personal information the Social Network code was used. The Concern code denotes the sections of the transcripts where lecturers expressed worries about integrations of Semantic Web. Assessment code highlights the information shared by the interviewees in relation to assessment. The Code matrix has been generated to identify occurrence of each code on all the analysed interview scripts.

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\(^6\) http://random-name-generator.info/

\(^7\) http://www.maxqda.com/

\(^8\) http://www.wordle.net/
Word Frequency

Word frequency summarises the analysis of the frequently used words by interviewees. This analysis has been driven to identify specific concerns about the Semantic Web implementation. Furthermore, is used to identify terms and concepts that that have been missed at the coding stage. Word frequency has been generated using MAXQDA software. Prior to analysing the word frequency, all the interview questions have been removed from transcripts. Furthermore, a filter has been used to remove all conjunctions, prepositions, pronouns and single letters. Making use of www.wordle.net\(^9\), a word cloud has been generated to provide a graphical interpretation of the word frequency of the transcripts (see Figure 7). The review of the frequency table as well as the generated word cloud may suggest that the interviewed participants have a strong focus on the student, concepts of interaction/discussion, data as well as the VLE. The analysis of the interviews was conducted bearing in mind the research aims and objectives. Structure of the interview provides three themes of analysis. The first theme, Social Network Interaction, identifies the kinds of actions, tools and expectations of interviewees from the potential functions of the Semantic Web. The second theme, Engagement with Educational Content, focuses on the types of data and data analytics that can be used with Semantic Web technologies to shed light on student engagement with educational content. The third and the last theme of the analysis, Ownership of Engagement Data, depict any potential ethical and legal issues in connection to implementation of the Semantic Web.

\(^9\) http://www.wordle.net/advanced
Social Network Interaction

Social Network Interaction section provides different views, with different levels of agreement about potential of Semantic Web. Student interactions with VLEs presented as a map is a tool that the interviewees have been agree that enhances learning analytics and student engagement (Drachsler et al., 2012). Student interactions map present all the student interactions within VLE, implicitly with provided content. Mapping of those interaction have been suggested to be a “snapshot as a single thing”. Visualisation of interaction maps over time, according to most of the interviewees was considered to be important because it provides a view of the student evolution during the learning process and is a source of engagement analysis. Kelli underlines that the time bound interaction maps “are assessing not the student’s knowledge with the particular class, but his activity”. The VLEs provide various mechanisms of interacting, such as: discussion boards, chat massages and passive interaction such profile views. All those mechanisms, when analysed, can provide a picture of student engagement with the e-learning system as well as his/her learning process.

Discussion boards are considered to be “useful because students create and debate certain subjects”, “offer student interaction” and create a space of “sharing ideas”. Direct messages are considered by the interviewees to be an inadequate interaction tool “because some of the students might get into some sort of conflict”. Furthermore, analysis of those messages by a computer raise an issue of inaccurate results, “some words are used differently, if you’re talking about philosophy, […] or about mathematics, a computer, even though I know they are very clever machines won’t have the capacity to fully comprehend everything”. Profile visualisation is considered to have a low impact on student engagement analysis. For Scott, passive interactions, such as viewing profile, “show a level of interest and a level of engagement in the course, but will not be a level of engagement that I will be happy with”. To address the problem of disengaged students the research identifies potential engagement mechanisms with online content. One of these mechanisms suggests providing learning content as a game. Another mechanism suggests online quizzes that send the students to identify different aspects of the content that have been provided on the VLE. Mixed mechanisms of student engagement have also been considered, namely a mixture between a classroom lecture and provision of content on VLE. Similarly to getting recommendations from human participants, Semantic Web allows computers to provide recommendations base on system interactions. Those interactions can be captured and analysed by a VLE and used for providing recommendations. The automatic recommendations made as a result of the analysis of student engagement have been generally accepted by the interviewees and have been consider useful. Scott, for example, says:

“This is the real power of Semantic Web, creating this connection, recognising whether a reservoir of information that could help us”.


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Some concerns about recommendation capabilities come from various reasons such as:

“when you search it automatically starts giving you alternatives to the items that you were interested in from the first place”, or “could be people who have less time and just seat on the whole time, [...] trying to get connected. [...] People now have more knowledge on a subject on a computer not necessary have more knowledge; they can appear to have more knowledge”.

**Engagement with Educational Content**

Engagement with Educational Content focus on the types of data and data analytics that can be used with Semantic Web technologies to shed light on student engagement with educational content. When the interviewees have been asked about analysis of student interaction, rather than a simple filter using predefined conditions, they were agreeing that “the more information you have the better” (Drachsler et al., 2012). If the VLE will capture a wide range of student interactions logs, the student engagement analysis will be more accurate (Agudo-Peregrina et al., 2014). Student engagement analysis involves a range of data about students, from physical attendance in the classroom to actions that the students perform on the VLE and provided content interaction. Some concerns that were identified from the analysis were related to the fact that the results can be misleading if the student has not got the sufficient computer skills for using the system. Less skilful students are going to have lower levels of interaction through a VLE. The analysis of interaction in a VLE will provide an only partial picture of student engagement with the learning process because of the missing information on face-to-face and classroom interaction as well as the information on the student behaviour that is missing from the captured data in VLEs (Agudo-Peregrina et al., 2014). Some of the interviewees have highlighted the needs for having additional tools tailored for a range of students, including “disabled or foreign students”, as well as based on the levels of students’ knowledge and skills. The representation of student engagement and interaction with the learning content has been identified as one of the most useful features. An automated tool, which performs this analysis was considered to be highly valued by the academic staff. This is in line with the review of the past research (Jovanović et al., 2007). Academic staff considers visual representation of interaction “to be an essential part of teaching” and “can affect [...] teaching and learning” process. Additionally, if a VLE could highlight the comprehensibility analysis of the learning content it could become an important part of teaching and learning process. Mike says:

“I consider to be an essential part of teaching, if you observe that students are struggling, then you can take further actions like uploading supportive materials in order to help them. It is difficult; [...] you have to keep adapting to be able to pass on the information to the students.”

Other aspects of student engagement through VLEs such as discussion boards and chat massages have also been found useful. Semantic analysis of discussion boards and chat messages are considered to be an important aspect of student engagement analysis. “If the Semantic Web gives the capability to provide this kind of data it is very important…” Concerns were raised, however, with regards to the capabilities of the computer to analyse the textual content:

“If maybe some words are used differently, if you’re talking about philosophy, with a low voice or about mathematics, a computer, [...] won’t have the capacity to fully comprehend everything …”

The semantic analysis should take into account that a word or a concept can have different meanings across different study fields or in different contexts. These concerns have also been highlighted in the previous research (Eiter et al., 2008) and the challenges of analysis should be approached carefully. An appropriate semantic analysis has to be used across different fields of study for providing appropriate understanding of the discussed content. Student engagement analysis can take place beyond VLEs due to the possibilities provided by the Linked Data implementation of publishing content on the Web. Analysis of interactions performed by students outside VLEs is considered to provide a better understanding of student engagement. A higher level of attention has to be kept at the sources where data is coming from (Cami, 2011). Similar views were voiced during the interview: “I don’t know how much credit I would give to an external source.” The research suggests that most of the analyses of student engagement presented above can be performed automatically by computes (Ali et al., 2012;
Siadaty et al., 2011). This automation of analysis that uses the available data about student online behaviour and interaction is possible. Certain patterns of student interaction can be identified from the collected data. Making use of those patterns and the subsequent automated actions and recommendations can be performed on behalf of users, students or lectures (Mobasher, 2007). The interviewees suggested that implementation of automated actions and recommendations will enhance student engagement analysis by getting notification about specific students that do not perform as well as expected. Scott was very excited and said:

“Yes, I think that is absolutely brilliant. In the certain apps I use the different colour prompts me to do different things or to predict what I’m going to do. I think it’s not different in learning. Let’s say you run a 10.000 words dissertation and you have 13.000 words and you have no citations, I think it will be a very good idea to prompt you that you don’t do it in right way.”

Those actions and recommendations should be addressed by the lectures not by the student because “I’m the one who assess them and therefore should get the final say in what and what not should be recommended to my students” and “The students may be very computer orientated, and following their advice entirely might not be a good thing to do”. Nevertheless, according the interviewed academic staff, for students simpler forms of notifications and recommendations are acceptable.

Ownership of Engagement Data

Learning analytics enhances learning processes by looking into online student behaviour. The results of online behaviour analysis, when presented to the students, can be a source of self-motivation for them:

“If they know that I know, they may consider doing something else. I think transparency of data is always one hundred percent important.”

When analysing student engagement, the personal details of the students as well as the generated system logs can be analysed together. However, the learning providers are responsible for storing and managing the data in a responsible way, because “It’s about personal data that have to do with the behaviour of the specific users.”

Legal regulations should be put in place to enhance student privacy. If the learning providers decide to use the data for the purposes of statistics, they have to keep anonymity:

“...can keep it but for x amount of an x amount of years, because they do the study and to have a start to improve the service for the students.”

The desire of having a clear picture about students, academic staff can make use of external sources such: social networks, websites and personal blogs. Increased use of social networks, websites and personal blogs increase the risk of inappropriate use of student personal information available publically over the web by educational providers. Some of the interviewees were concerned that the external sources describe the private lives of the students. “If you create a record on public social network you take responsibility for that. Have to be more concerned about what data we’re using.” Mathew accepts that “Universities do that all the time. I really think they should not but they are allowed to.” and expect that the “students to be extremely unhappy and say ‘Why you are looking into my Facebook for?’”

Scott, on the other hand, considers it to:

“Be a good thing. For instance a student that’s not coming to class and he calls that he’s very ill and quickly looking on Facebook just to reveal that he is on holiday. So, as long as it is publicly available and can be accessed with any legal restriction.”

Kelli says “Legally and morally it is wrong to be able to obtain anything without the students consent unless it is publicly available.”
Student engagement analysis tools of the future must be able to gather information from different sources “together in a kind of colour chat or something like that”.

Additionally “more techniques and tools that could aid a lecturer in better understanding their students on an individual basis and to help them deliver the lecture in a better more efficient way,” and “A combination of what we have talked about.” One more thing that is expected from the next engagement analysis tools is the clarity on transparency:

“Open and transparent would be contractual. By contractual, I don’t mean a legal contract, but understanding whether the student understands that we’re looking at everything that they did on the VLE and things. We are using this data in a responsible way. He will be informed with what we are doing. A consent form looks a bit like saying in a school ‘Do you consent to me looking at your homework?’ This is the work that you are doing. You don’t read a book, you read a text. We want to see what you are doing. In the real world, in the future, I am sure that in the universities contract somewhere it says ‘we would be able to access your engagement data’.”

Semantic Web makes use of semantic relations within the content for creating connections between published data over the Web. Semantic relations are presented in a form that computers, as well as the humans, can process and analyse. These relations are presented in RDF triplet format, using RDF or RDFs standards. Even more, complex syntax representation makes use of different OWL ontologies. On top of RDF data format, a SPARQL query language has been created to enhance information finding over the web content. Furthermore, logic, proof and trust issues are addressed by the top layers of Semantic Web and as a result, the web content becomes trustworthy. Linked Data provides a framework of Semantic Web technologies to link together all kinds of data across the web. The technologies are working together to publish web content in a way that is understood by humans and computers across different languages.

In an educational context, the Web has been used to disseminate information. The evolution of the Web moves the classroom interaction to VLEs, where learners and lecturers are able to share information and collaborate with each other. Those interactions become valuable information records for analysing student engagement where classroom interactions are not present. This has been stressed by most of the interview participants. Superficial reports of learning analytics based on logins, access, attendance, or downloads provide just a partial image of student engagement. In response to this problem, Learning Object Context Ontologies (LOCO) has been developed. This ontology it is provide comprehensibility of semantically interconnected data of a learning process, including learning activities such as reading and discussing, learning content, learning outcomes, and students behaviour (Jovanović et al., 2007). Learning analytics using semantic interconnected data can therefore provide a higher qualitative understanding of student behaviour in VLEs. Making use of visual tools, the data can be presented in a visual way. Visual representation of student interaction has been considered by interviewees to enhance student engagement and provide a better understanding of learning analytics.

Conclusions and Implications

It can be deduced from the interviews that the implementation of semantically interconnected data formats on VLEs will provide wide view of student behaviour. Semantic data interconnectivity gathers reliable information about the students that have been done on online environment. This information can then be used by the academics for a range of learning analytics methods. Using SPARQL, for example the data can be queried on specific interactions. The results of these queries can be presented as a graph to depict behaviour of specific students, or a group of students. However, some concerns were raised by the interviewees with regards to the legal, ethical and privacy issues, making the recommendations on the adoption of technologies less straight forward. The outcomes of the research suggest that the interviewees perceived that the computers are not in a position for providing accurate recommendations without a human intervention. However, making use of Logic and Proof Layers, as highlighted in the literature review, various specific conditions may be applied to address this problem. For example, if a student had no VLE interaction, or presents a low level of interaction, using logical rules on the VLE can send automated notifications to the student as well as the lecturer. Proof layer traces the steps involved in logical decision to identify the way a specific decision has been made. Web content published in Semantic Web standards is considered to be reliable because of the proof layer
that trace the owner of the interaction (Cardoso, 2007). A specific problem identified as a result of this research is that different students may have different levels of skills and knowledge. Therefore, providing a recommendation that does not take this recommendation into account will not be very effective (as highlighted by several interviewees). However, if a person has been evaluated using Semantic Web technologies and given the use of the Logic Proof and Trust layer application an appropriate accuracy in providing automated recommendation could be possible. Increasing use of social networks and personal websites or blogs provides a higher risk of publishing personal information publically. Many if the interviewees were concerned about the use of personal student information for engagement analysis. Learning providers accept that they have interest to look into this types of data because of being easily available. However, as identified from the study, a careful approach is needed with regards to the use of personal data. Ethical, legal and privacy concerns were raised by the interviewees, highlighting the problematic issues of using the data despite all the potential benefits to student engagement.

It must be acknowledged that the study had its limitation as Griffin (2005) mentions, such acknowledgement can raise queries over the validity and reliability of any research. First limitation of conducted research rise from the number of participants. Eight academic staff takes part of this research. Second limitation refers to the sample size. Applied time constraint of conducted research and busy professional and personal life of academic staff have been the considered choosing sample size. Reliability of data obtained by the conducted research was not affected, although validity of collected data could have been improved, and patterns have in depth studied with a sample size. To complete the analysis four key milestones were identified. These milestones encompass the research process from the interview design to data analysis. Two weeks were allocated to prepare the interview scripts. The following three weeks were allocated for running the pilot interviews and polishing interview questions. The interviews were conducted in the following three weeks. Data analysis was conducted during the following two weeks after the interviews. A total of ten weeks was allocated for conducting this research, excluding the time for writing up the dissertation.

A number of implications were identified as a result of this research. VLEs are using superficial reports of learning analytics and student engagement. Student engagement data such log in, access, attendance, or downloads, creates a partial view of student engagement. Even if semantic technologies, such LOCO, have been developed, the VLEs do not incorporates such technologies and are being used for engagement analysis at a low level. An approach which will integrate the use of ontologies, such as LOCO, will provide for detailed and meaningful picture of student learning within the e-learning environment. Student interaction with VLE depends how skilled the person is. Addition information on the levels of students’ computing skills should be required for providing a balanced picture of student interaction. Where issues in relation to their computer skills have been identified, the learning provider should take the lack of skills when considering his/her engagement with the VLE and normalising it across the cohort of more computer savvy students. As a result the learning analytics score of less technically savvy students will not have as low scores compared to those with better computing skills. Therefore, an initial assessment of a student is recommended here, which will feed the algorithms of learning analytics tools. A differentiation between students with special conditions from others should be made when conducting the analysis of engagement. A disabled student may require specific tools or support. Similarly, foreign students may require (perhaps initially) some support in understanding certain concepts with which they are not familiar. Therefore, the recommendation for the development of learning analytics tools should include the requirement for categorising and distinguishing the students with various needs.

References


Investigating the Impact of E-Publishing on the Future of Libraries

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Abstract

The main purpose of this study is to examine how the preservation of electronic publications has changed throughout the development of e-publishing and the impact of these changes on libraries; the evolution of libraries since their adoption of electronic publications, and to examine the benefits and disadvantages of that evolution to date; the challenges of digital preservation and cataloguing metadata and the issues that the libraries are facing in the digital age; identify the ways in which libraries can improve cataloguing metadata for different types of electronic publications including web content; identify the avenues for libraries in fully designing and implementing a robust cataloguing metadata standard; and recommend improvements for more sustainable digital preservation of electronic publications. Among the key research questions was to establish whether current metadata standards sufficient for digital preservation, as well as how metadata standards may be improved. Currently, most libraries have not been able to provide satisfactory searchable-access experiences for their users. However, this study’s findings show that building a single database from where everyone can be connected, is the first solution to a sustainable digital preservation and a way to securing a sustainable solution to the challenges of digital preservation. Indeed using a single database will help build a better metadata infrastructure through collaboration rather than development of fragmented new standards. This will eventually become cost effective and also eliminate duplication of effort in developing solutions that are not guaranteed to be sustained in the future.

Keywords: Digital preservation, Metadata, electronic publishing

Introduction

The continuous developments in information technology result in significant changes taking place in the field of publishing. The libraries are facing a number of challenges (Hielmcrone, et al., 2012), due to the growing eBook market and publications of eBooks as opposed to paper-print, “AAP estimates: E-book Sales Rose 117% in 2011 as Print Fell” (Publishers Weekly, 2012). These electronic publications cost considerably less than the traditional printed publications (Stemmer, 2000; Coker, 2014), with rare exceptions where e-publishing costs more (Bentley, 2012). E-books and audiobooks can be borrowed without the patrons going to the library to borrow, as they can be made available anywhere via the Internet. These fundamental changes have had a big impact on libraries. Libraries now have to provide the same activities on electronic publication as well as printed counterpart, and they have to come up with new ways of lending in order to accommodate the different media of the material they acquired. For example, they need to ensure that an eBook is ‘returned’, and no longer available to the borrower once the borrowing deadline has passed. Addressing these challenges will determine the future of libraries and their main objectives such as: to make a broad scope of published materials available for personal study, educational development and research for the purpose of new discovery and development in order to keep Gutenberg’s vision alive; by ensuring knowledge materials are available for all, for new discovery. The current research therefore seeks to investigate the impact of e-publishing on the future of libraries.

It is essential to know how libraries will accommodate economic trends and oblige to new realities, focusing on the creation, control, design and implementation in relation to the preservation of digital resources and better patrons’ searchable-access experience by improving current cataloguing metadata, and effectively communicates the value to all interested stakeholders, by clearly articulating a more compelling reasons to support libraries in order to continue to receive all necessary support needed, else might be strained by economic substantiality to stop doing so (Anderson, 2011).
consequence this study explores six key themes: First, value communication: the increasing data curation challenges as regulatory standards for all types of data are to develop gradually (Tenopir, 2011). Second, data preservation: as digital collections grow, there are increasing concerns about the general deficiency of long-term scheme for their preservation. No strategic leadership for building standard approved model architecture, policy, or standards for creating, accessing, and preserving digital content for further research need in the very near future (Gore, 2011). Third, the mobile environment: mobile device is another driving-force adding more way for which digital information is delivered and accessed. Fourth the Patron-Driven Acquisition (PDA) of eBooks, which is set to become the standard (Smith, 2011; Thomas, 2012). For this establishment, licensing options and library lending models of e-publications to become more sustainable. Fifth, user behaviours and expectations: convenience act on all nature of information seeking, considering the selection, accessibility, and use of sources. Sixth, cataloguing metadata challenges: the need for better recording of e-publications, such as knowing when an e-publication has been alter since it was first created. However, in digital age libraries often not the very first source to search information. According to Connaway, et al. (2011) and ACRL (2012) when users was asked, respondents describe the library as “hard to use”, “the last resort”, and “inconvenient”. Convenience is a compelling factor in both academic and everyday life in information-discovery case and also better patrons’ experience play a major role.

Various aspects of the changes to libraries as a result of the rise of electronic publication, such as the advantages and disadvantages of using e-publications, the ability of e-publications to satisfy user expectations and needs, the current and possible roles of electronic media in libraries have been explored in the literature (see Bennett and Landoni, 2005). The literature has also examined the possibilities for the sharing of electronic resources, such as e-Book, audio-book and other electronic media using new technology, altering the usual settings of traditional libraries as the middlemen (Hoorebeek, 2003) by developing a new strategy in order to meet the digital demands of the world today, and the current challenges facing libraries, increases the need for librarians to have a good knowledge of the patrons complex needs and concerns in terms of alternative publications in the subject area, best sellers, recommended and best deals (Ashcroft, 2011), and the threat that libraries may be less efficient and effective if they do not adapt to the changes that are taking place (Duncan, 2010). Researchers are also discussing the educational role of libraries and consequently the ethical issues arising from the evolution of libraries (Duncan, 2010). However as technology progresses, a more accurate and up to date assessment of the possibilities that present themselves becomes necessary; as the possibilities themselves change with the evolution of technology, and hence a timely research into the possibilities for evolution that are open to libraries is needed. This research is going to contribute to the ongoing discussion in the area.

Librarians’ understanding of how contents in their library are used and by who, as they need to understand the usage beyond the currently available reports delivery, for examples it is essential to know which articles often read, how frequent, area of disciplines, by which types of users (professions, interest and aims). How best can they present licensing models (MaRS, 2014) use by the libraries to their patrons and senior management, as digital licensing models are sometime hard to explain to those who have not stepped into digital license models (Gillingham, 2013). Embedding their services full in the researcher and learner workflow, they need to intimately understand the needs and behaviour of the users and point of interaction with library service, in order to deliver relevant information at the point of need with a service, to make the real difference to people’s life in the journey to new discovery or knowledge acquisition. Bundling and/or supplier collections selection issues which can affect attractive pricing based on the Librarian eBook Survey in 2009 and can save selection time, acquisition and processing (HighWire Press, 2009, p. 32). “A large number of librarians believe that bundling of content by publishers without the option to purchase unbundled parts is the cause of much of what is bad in digital collection development. However, the option to purchase bundled content cannot in itself be considered bad” (HighWire Press, 2009, p. 29).

This study seeks to identify the potential routes of changes in libraries and proposed recommendations on how the libraries should adapt to the recent technological advances and trends. This research is going to make a contribution to the research literature and address some of the following gaps highlight: Effective way of communicating libraries value, Acquisition and processing, Data curation challenges, Digitalised data creation, control and preservation, Mobile Environment integration and development of standard model, Patrons’ convenience, How to improve metadata standards to enhanced the searchable-access of the electronic resources in their library. Overall the study seeks to examine how publications preservation has changed with the development of e-publishing and the impact of these
changes on libraries; examine the benefits and disadvantages of this evolution to date; evaluate the challenges of digital preservation and cataloguing metadata issues that the libraries are facing in the digital age; with a view to finding the ways in which libraries can improve cataloguing metadata of different types of electronic publications including web contents.

Literature Review

Libraries are dedicated spaces, which could range from being a room, set of rooms, or an integrated/whole building, where knowledge resources may be read, borrowed or bought. These resources span the domain of books, papers and academic journals, and other relevant materials for reading, viewing, listening, studying, or referencing. This study focuses on the effects of the recent phenomenon of e-publishing on the traditional libraries. However, prior to embarking on the study of e-publishing and the libraries, it is necessary to identify what libraries are and narrow the focus of the study on the most pressing issues facing modern libraries. It is essential to acknowledge the existence of different types of libraries, as the whole impact of e-publishing on all types of libraries cannot be evaluated within the boundary of a single study. The review of the literature indicates that the categorisation of the types of libraries varies from one author/source to another. For example, the Indexer (2008) categorised libraries into three: Public, Academic, and Special Libraries (see Semertzaki, E., (2011). The American Library Association (ALA, 2015) classifies the libraries into four categories – academic, public, school and special libraries without mentioning the national libraries. While some others categorised libraries into four groups as follows: national, academic, public, and special libraries (Sabol, 2010; Jefcoate, 2006; Chowdhury, et al., 2006). The prevalence in the literature, however, is given to the later categorisation of libraries, which is adopted in this research, a brief overview of the types of libraries and the justification of choosing a specific type of a library as a focus of this study is discussed.

Academic Libraries can be sub-divided based on the level of materials acquired by each division into primary, secondary, college and university/higher institutional libraries. The libraries primarily serve colleges and universities, their students, staff and faculty, because larger institutions may have several libraries on their campuses dedicated to serving particular schools, such as law and science libraries, academic librarianship offers a great opportunity to utilise subject expertise. Professional status of these libraries varies from one institution to another. This enables school librarians working with both students and teachers to facilitate access to information in a wide variety of formats instruct students and teachers on how to acquire, evaluate and use information and the technology needed in this process. At times, they introduce children and young adults to literature and other resources to broaden their horizons. As a collaborator, change agent, and a leader, the school librarian develops, promotes and implements a program that will help prepare students to be effective users of ideas and information, a notion considered to be a lifelong skill (Issa, 2009).

The objectives of academic libraries are: to accomplish the objectives of institution at college level; to increase the usage of resources and users satisfaction; to make the users aware of collections; and to enrich the collections based on the needs. The functions of academic institutions are: collection development and maintenance; stock verification; providing a variety of services such as lending, references, current awareness, abstraction and indexing, reprographic, exhibition and special display, selection and dissemination information (SDI), alerting, newspaper clipping, bibliographic, translation, documentary delivery, user orientation seminars and workshops, and general assistance in the use of library services. Among the typical users of academic libraries are students at different levels, including research students/scholars, post-doctorate research scholars, teachers/lecturer, professors and domain experts, members of academic and executive bodies, as well as institutional members (ALA, 2015).

The use of e-resources by academic libraries is prevailing due to the impact of information and communication technology (ICT) in almost every sphere of life for efficiency and effectiveness of their services, and complacency of sundry user needs. Currently, ICT is part of almost all the curriculum at least as a selective module and ICT has become very important part of most organisations, to drive competitive advantage (Kushwaha, 2011; Borghoff, 2011). This has caused the transformation of physical traditional libraries to expand into virtual environment to supplement, accommodate and make available electronic resources in order to support academic members, users including researchers at all level, for knowledge discovery. According Ollé & Borrego (2010) research into measurements of,
and the utilisation and references of electronic assets, and on patrons’ reviews, confirms an energetic movement from print to electronic resources. A considerable number of clients demonstrate a high acknowledgement of electronic assets and an unwillingness to rely on print-only formats. It is very important looking into academic libraries as it is a starting point for almost every areas of life and has contributed to wider range of information and knowledge discovery, and highest number of academic researchers have contributed immensely to science and technology, including national economic improvement (Cooper, 2011; Oakleaf, 2010; Somi & Jager, 2005).

**Access to E-Resources**

Electronic resources access is the ability to search and have access to library catalogue (or library inventory) of users interest, based on what library had register of all bibliographic items found in a library or data centre or group of libraries (for example, libraries networked to multiple locations). Hence, this part of the review aims to identify the current cataloguing metadata standards and evaluates their suitability to meet patrons’ requirements when searching for resources. Based on this review, this research will then identify how they can be improved to fit the purpose. Additionally, this research will look into the current available practices of cataloguing digital resources and examine if they are appropriate.

**Metadata**

Library services heavily depend on metadata when it comes to digital repositories. Metadata is defined as a set of data descriptions that provide useful information about data resources or representations of certain properties of an asset (Godby, et al., 2003). Nadkarni (2011, p. 1) stated that the definition of metadata as “data about data - is too broad to have a practical value”, and claimed that the employments of metadata itself across computing sector must change. The diverse ways of its representation make it impossible for two independent experts to devise metadata precisely in the same way. Marco (2003) says metadata, is the foundation of knowledge management. Practically, this implies that metadata goes hand in hand with a digital resource and it would be much harder that metadata did not exist. Metadata may be structured in a way that can be understood by non-technical person, or in a structure to be utilised by software/database. Part of this research will focus on metadata that accompanies data in the digital libraries repositories.

A number of researchers from the UK such as Currier, Barton, O’Beirne, & Ryan (2004), stated that metadata should be well-structured and reaffirm that the choice of the metadata standards influences indexed lists and lead to the imperceptibility of assets in a digital archive. Lagoze et al., (2006) contended that regardless of the possibility that even if every other parts of a digital library would work faultlessly, ineffectively used metadata would degenerate the library services. Crystal & Greenberg, (2005) have called attention that simple to automate metadata with assets is inadequate. Additional properties will result in wealthier metadata and ensure it usefulness. Though Bowen (2008), started a project in the University of Rochester called eXtensible Catalog (XC) which is an open access solution, the project team tries to make the best use of the existing library metadata standards e.g. MARC 21, and intended to address the challenges. However, the project is still in phase one since 2008, and has not yet moved to its final phase two. Meaning the project team has not yet resolves the existing challenges found in the current metadata standards as at the period this research was conducted.

Yasser (2011) described, analysed and compared various published literatures on existing metadata problems and grouped them into five categories: [a] incorrect values, [b] incorrect elements, [c] missing information, [d] information loss, and [e] inconsistent value representation. See Appendices D for the meaning of each of the categorised problems. This analysis suggests that metadata issues have been accounted for in different contexts, but there are similarities among the identified issues. These classifications offer a valuable apparatus for further research in creating systems to tackle issues in metadata records. Albeit there are various contributing variables that influence digital assets visibility, it is the rich metadata that is reliably encoded that makes the digital resources more accessible (Tmava & Alemneh, 2013). In recent article published by Kichuk (2015), clearly mentions that metadata remains the problem and the persistence of this problem affects the adequacy and accuracy of optical character recognition (OCR). This research will make an effort to identify possible solutions to the five categorised metadata challenges by [a] interviewing librarians and their use of metadata practices that enable to overcome the existing issues and [b] evaluating the metadata standards adopted in these libraries. By
conducting this research, this dissertation will enable narrowing the gap in the literature and offer recommendations in preserving digital resources and improving their searchable access. Preservation and the use of metadata are the biggest challenges facing the digital libraries, affecting the discovery and visibility of digital assets. If the accessibility of e-resources becomes problematic the main role of the libraries in curating the digital resources will remain unachievable.

**Digital Preservation**

Preservation is about documenting everything that is vital around a document and making it available for analysis, it is not about individual records or bits, it's about permitting people to get it and understand its purpose (Rinehart, et al., 2014), as frequently it can be difficult to become mixed up in the technological points of interest of digital preservation and dismiss the definitive objective. It is important to do this research as a number of researchers/scholars have identified on-going challenges, that are not yet resolved and this research aims to identify solutions to some of these challenges and recommend ways forward (Thibodeau, 2002; Lavoie & Dempsey, 2004; Ross, 2012; Han, 2012). Electronic Resource Preservation and Access Network (ERPanet) conducted a case study using seminars and workshop in which they attempted to reach more than 300 institutions, while only around 30 institutions agreed to participate in the case study. The researchers highlight that most institutions, at first, express an enthusiasm to participate, however, some organisations drop out when data collection stage reached or lose their aptitude. Others libraries withdraw once becoming mindful of the lack of best practices in their institutions or failing get consent from their legal teams. The interviews were conducted with archivists/records directors, data frameworks/innovation chiefs, and business supervisors at the target institutions to collect a thorough and specialist data and gain a bird's eye view of the sector. The case study recommends actions that need to be taken and issues that need to be addressed with regards to preservation of digital heritage. Some of these issues are observation and attention to hazard connected with data misfortune, how digital preservation influences and affects the institution, individual and overall body of knowledge discovery, the moves organizations are making to avert data misfortune, how institutions monitor these activities, and what mechanisms institutions have put in place to enable them to characterise their digital preservation needs (Ross, 2004, pp. 78, 80-81).

At the end of Lisbon European Council in March 2000 (Lisbon Council, 2003), European Union Member States communicated the point that within ten years Europe ought to turn into the most focused and element information based economy on the planet, equipped for supported financial development, from that point forward e-commerce, e-government, and e-content activities have proceeded with their pervasive entrance of European society. We generally perceive the benefits of using digital communication technologies and computerised data. E-business and e-government initiatives continue to raise awareness of the need to give society solid and dependable data sources and to guarantee that the products and by-products of these activities will be available over time. Guaranteeing this vision turns into a reality relies on the survival of digital information in open, usable, dependable, and credible state. This indicates that preservation interest is across the board, including government body. The Consortium of Academic and Research Libraries in Illinois (CARLI, 2010: 2), defines digital preservation as “a commitment to maintain long-term access to digital objects through standardisation, migration, and replication of those objects on numerous servers in multiple locations." In this manner, digital preservation is truly “a multifaceted issue that is seen contradictorily by diverse institutions and distinctive experts” (Hedstrom & Montgomery, 1998, p. 7) and choosing which of these facets to deal with, is the primary challenge faced by many institutions. However, this study faced criticism particularly with regards to e-publishing preservation (Rinehart, et al., 2014) due to the confusion and the lack of robust research methodology. This criticism highlights the needs for additional research that needs to be conducted to address the challenges of digital preservation of electronic resources. There is a high level of misconception with regards to the notion of digital preservation. One of these common misconceptions is that preservation and accessibility are not different. Additionally, providing access in itself is insufficient for the ensuring preservation (Parliamentary Archives, 2009). Namely, access is not the main component of preservation but is a desired element of it. Access to records might be given higher priority over preservation as it bestows instant satisfaction than preservation, especially to patrons or other interested parties. Nevertheless, with the absence of preservation, accessibility over time becomes unachievable. Hedstrom and Montgomery (1998) acknowledge that the long-time preservation is in state of crisis. In order to address this emergency, libraries need to be insightful about how assets are dispersed, in order to verify that digital preservation is not overlooked (Jacobs & Jacobs, 2013).
Similarly, the distinction between digitisation and preservation is another common misconception. A number of researchers (Chrisman, 2015; Knight, 2011; Jacobs & Jacobs, 2013; Ramsey, et al., 2010, p. 87) highlighted that digitisation is not synonymous to preservation. At the time when NASA mistakenly deleted the important recordings of the Apollo 11 moon arriving in the 1980's (Gunawardene, 2009; Mick, 2009), that was a great loss of vital information and body of knowledge, this happened because NASA only paid attention to the accessibility of the information without given consideration its preservation, and when there was an erroneous deletion, the complete original information could not be recovered as there was no preservation it. This contributed to the reasons why this research will focus on e-publishing preservation as part of this research. Though some standards already exist for digital preservation but there are limitations on these available standards (Puglia, et al., 2004; 2010), while others are on-going discussions (Day, 2010; Arms, et al., 2013; IFLA, 2014). Therefore, with all this currently available standards and on-going discussion, this research want to identify what further steps the libraries are now taking to addressing this common issue of preservation, as there is still not enough research conducted to facilitate permanent solution to digital preservation challenge, because knowing how to look for the most important data to be documented and stick to the best conceivable practice is key to both sufficient preservation and the proficient utilisation of constrained resources.

In a survey participated by fifty-four institutions have found that technology obsolescence is the greatest threat to the sustainability of e-publishing preservation and long-time access (Hedstrom & Montgomery, 1998, pp. 19-20). Whitt and Hastings (2005) presented digital preservation as a project in their research conclusion, however, cannot be regarded as a project, it’s a program. A typical trap of all innovation activities in the library is to consider preservation as project rather than programs. “Project is unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal” (PMI, 2015). Technology may change rapidly, and staff turn-over is inevitable, preservation is a long-term commitment, as technology change quickly and new data format emerging now and then, creating shift from one to another as efficiency is continuously a deterministic factors to effectiveness of data management (e.g. read & write speed). This contributed to Kastellec, (2012) to conclude that costs are digital preservation’s most pervasive limitation. Based on all these challenges of preservation issues like misconception of digital preservation, restricted resources – change fatigue, lack of training, lack of engagement, Perception towards digital preservation as project not program Cost of reformatting is another issue Lack of librarian practical knowledge and lack of engagement. Even the British Library stated "we have well-established processes to achieve this for physical items, but we have yet to establish the same for our digital collections" (BL, 2013), and they have incorporate this into their strategy to be achieve but not yet achieve, and this re-enforces how relevant this research into digital preservation and in order to contribute to the body of knowledge, while coming up with suggestions on how to tackle this preservation challenges facing academic libraries.

Overall this literature review examines the evolution of academic libraries since the adoption of electronic publications (e.g. e-Books, audio-Books, e-Papers and Academic e-Journals) by libraries and identifies the challenges as well as the opportunities powered by this change in the research decade. It identifies the gaps in the research literature that addresses the proliferation of digital educational resources, their ephemeral nature, access and preservation. To examine the evolution of academic libraries since the adoption of e-publications, this literature will review published literatures related to the preservation, accessibility and availability of digital resources over time.

**Research Approach/ Design/ Methodology**

The first purpose of this study was to explore with sample of librarians, archivists and records managers in archive services their perceptions of the challenges of libraries since the adoption of electronic publication. The main idea was to understand what the challenges of establishing a permanent solution to digital preservation of relevant electronic media being acquired by the libraries and archive institutions and to identify how these challenges can be resolved. Secondly, to find the root cause of existing cataloguing metadata challenges and identify ways forward to dealing with current metadata standards.

A better understanding of this phenomenon would enable libraries to proceed from a more informed perspective in order to find solutions to these two (digital preservation and cataloguing metadata) areas where libraries are faced with challenges among other various challenges posed since the adoption of

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In seeking to understand the challenges and solutions to digital preservation this study addressed six research questions: (a) what can be done to address technology obsolete problem and how?; (b) what type of training do librarian, archivists and records managers in archive service require to develop their skills in the field of digital preservation, how best can this be delivered and how can we get experienced and professional trainer in this capacity?; (c) how does preservation miscommunication affect digital preservation and how can we address it?; (d) how can the increasing demand for storage and disaster recovery plan be improved to help achieving digital preservation for access over time?; (e) what role should ICT companies and software developers’ plays and how, in order to improve digital preservation?; and (f) what are the next steps for archive services in overcoming these challenges?

Additionally, to understand the challenges and to recommend possible solutions to cataloguing metadata this study also addressed further six research questions: (i) how can these metadata standards be improved? (ii) How do these solutions such as crosswalks, translation algorithm, metadata registries, specialised data dictionaries and other genuine advances resolved metadata standards interoperability, leading to incompatibility records?; (iii) what are the major obstacles for building a better metadata infrastructure?; (iv) what is needed for better metadata implementation across institutions and how can it be achieved?; (v) how can we improve the automation process on the generated metadata to verify that they are sufficient and searchable?; and (vi) how can improve quality control helps in maximising current metadata standards usage?

Several scholars have revealed (Bogdan & Biklen, 1998; Locke, et al., 2000; Mason, 1996; Maxwell, 2005; Merriam, 2009; Merriam & Associates, 2002; Patton, 1990; Schram, 2003) that qualitative method is grounded in a vital constructivist philosophical position, as in concerned with how the complexities of the sociocultural world are experienced, translated, and seen in a specific connection and at a specific point in time. The goal of qualitative research is to look at a social circumstance or collaboration by permitting the specialist to enter the universe of others and endeavour to accomplish a comprehensive as opposed to a reductionist understanding. Qualitative methodology suggests an accentuation on revelation and depiction, and the goals are for the most part centred on explicating and deciphering the importance of experience (Denzin & Lincoln, 2011; Bogdan & Biklen, 1998). These targets are differentiated by quantitative research, where the testing of speculations to set up actualities and to assign and recognise connections between variables is typically the purpose. It was decided that absolutely fully quantitative methods were unrealistic to inspire the rich information important to address the proposed research questions. In the context of this research, the basic presumptions and key elements that recognise what it intends to continue from a qualitative position fits well with this study. These features include (a) understanding the processes by which events and actions take place, (b) developing contextual understanding, (c) facilitating interactivity between researcher and participants, (d) adopting an interpretive stance and (e) maintaining design flexibility.

**Contextual Analysis – A Rationale**

This research has adopted qualitative research method to be carried out as part of this investigation, which has helped to build up a deeper understanding of the research in which in-depth semi-structured interview was used to collect data from six carefully selected librarians with extensive experience in digital libraries, as well as traditional library settings. Bearing in mind that this dissertation aims to contribute to the body of knowledge, by identifying solutions to digital preservation and metadata challenges the use of qualitative methods were considered relevant. Using the qualitative method of interviewing provided an opportunity to explore the topic in greater depth. Merriam (1998) indicates that qualitative case study is an ideal design for understanding and interpreting educational phenomenon. She describe that case study design is employed to gain an in-depth understanding of the situation and meaning for those involved. The interest is in the process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation. Insights gleaned from case studies can directly influence policy, practice, and future research. The present research fit well with Merriam’s criteria because it sought to better understand why digital preservation and catalogue metadata still poses great challenges in digital libraries today and hence, find a recommended solution(s).

**Sampling Procedure**

Purposive sampling has been used in this research. The audience who have adapted digital librarianship, having previously and/or partially operated in the traditional library have been chosen for the interviews. This was a mixed of expert sampling as there was a need to gather expert opinion. The
selection criteria in which psychological homogeneity was used for selecting the interview target audience for this research was librarians who are currently or previously in educational library settings, who are active and also have a good level of experience in digital preservation and cataloguing metadata. The sample universe homogeneity used in this research is impacted by both hypothetical and pragmatic factors (Laerd dissertation, 2012; Luborsky & Rubinstein, 1995). Theoretically, certain qualitative method have a slant for homogenous examples; such as Interpretative Phenomenological Analysis is clear that homogenous sampling work best in conjunction with its philosophical establishments and scientific procedures (Smith, et al., 2009; Patton, 1990). By keeping up a measure of test homogeneity, this research stay contextualised inside of an occupational setting, and any hypothesis from the study is made carefully to that confined testing universe, which are librarians. The sampling comprised of ten (10) librarians. Four participated in the initial interview piloting, to test the credibility and suitability of the interview questions before the other six (6) participants were interviewed. The choice of interviewees was based on selecting relevant librarians with good understanding of current and future phenomenon in the digital library. The study focused on ten librarians from various place; eight of whom were from the United Kingdom and two others from the United States of America.

The required information needed to achieve these research aims was determined by the conceptual framework and fell into two categories: (a) theoretical – an ongoing literature reviews providing the theoretical grounding for the study and (b) conceptual and contextual – the candidates must be working in a library setting and have a very good understanding of both traditional and digital library exposure, with the knowledge of digital preservation and cataloguing metadata that gives patrons better searchable-access.

Data Collection Method

Semi-structured, in-depth interviews were conducted through Skype with ten librarians, eight of which were from various area within the United Kingdom (UK) and two other librarians were from the United States (US). The two from US participated in the piloting stage and two out of the eight participants from the UK also participated in the piloting stage, which makes the total number four participants for the pilot four. The collected data script were analysed using inductive approach. Summary of the data collected during the interview were given to participants verbally at the end of each interview to reconfirm the integrity of data collected and researcher understand of it. An ongoing and selective review of literature was conducted throughout this study. Two topics of literature were identified: digital preservation and cataloguing metadata. The presentation of the librarians in this research is to understanding the situation through the perspective of the people who are practitioners in that field and understand how it works, and are able to give meaningful information, that can help to identify the problem areas better and can also make relevant recommendations. This will help to build the trust of the conclusions and the recommendations that result from this findings based on the expert opinion consulted. The rationale behind the approach used, was to make use of relevant information gathering technique and come up with trustworthy recommendations. This method allowed this research to be conducted in a more thorough, broad, and ensure quality to the study in order to have a supportive evidence of information got during the review of literature (Creswell, 2007).

The aim of this data collection was to choose participants, who have responded and having rich information handy, has helped in answering the research questions. The initial four piloted sample cases at the piloting stage have been part of this research analysis including the six other professional librarians who participated in the interviews. There were about twenty-five librarians originally invited by e-mail and in person, two of which was invited by my supervisor, two were invited by a different lecturer from the London School of Business and Management (LSBM), eighteen invited by myself, three were recommended by one invitee and fifteen out of those invited declined the invitation due to tight schedule as their main reason for not able to participate, while the rest of the ten participated has helped to answered the research questions. The interview site selection was based on the geographical distance, the stress of meeting face-to-face and cost associated with that, Skype has been made used of while the recording was done using Vodburner trial version initially and finalised with Audacity free project recording application with participants signing the consent form, to agreeing to the recording subject to using anonymous quotations in any thesis or publication that comes out of this study.
Discussion of Findings

The aim of this study was to investigate with sampling of expert perceptions of the impact of e-publication on the future of libraries, to clearly understand the challenges libraries are currently facing since the adoption of electronic media and the likely challenges libraries might be faced with in the future. Though, there are many challenges discovered during literature review such as legal framework, cost modelling, and others, this study only focused on two of the challenges which are digital preservation and cataloguing metadata. It was believed that understanding the perception of the experts working in this capacity, would provide insightful information that could help to find solutions based on recommendation. The qualitative inquiry necessitated the data collection via in-depth interviews and supportive data through reconfirmation of the data collected with the interviewees to ensure integrity of the data collected from the ten librarians who have participated in the research interviews. The collected data were coded, analysed, and organised firstly, by the main research question and followed by categories. The analysis categories are directly aligned with each of this research questions. The same categories were used for coding the data, and the findings are presented thereafter. In this section, the study primarily connects patterns within the analytic categories and themes that emerged among various categories. The secondary analysis used was cross-referencing relevant theories and groundwork to compare and contrast issues raised.

The data analysis process began by doling out alphanumeric code as per the classifications and descriptors of the study's reasonable system. The scientist arranged an A4 sheet, which were utilised to make a note of every topic (see Merriam, 1998). Each of those sheets were coded. Every sheet distinguished the descriptors under the separate classifications of the reasonable system. As the procedure of coding the transcripts continued, new A4 sheets were arranged to catch other themes as they rose. Before cutting and gluing coded interviewee quotes, the analysts imparted examples of coded meetings to two interviewees. The researcher additionally arranged written narratives on each of the sheets after all the information had been allotted. These accounts were useful in cross-checking the information and served as an auxiliary examination. Finally, to see whether there were any variables that would represent similarities or contrasts among members, the researcher tried the coded information on the sheets against the recurrence diagrams arranged for every discovering and the alphanumeric coded profile information on interviewees – which helped the analyst in their cross-case investigation of the information. The coding involved discrete classifications, a blend of which includes sorting these pieces out to build a holistic and coordinated clarification. The general methodology was to concoct various groups, patterns, or themes that were connected together, either comparably or uniquely, and that all in all portrayed or broke down the research coliseum. Getting to the end, three-layered approach in thinking and analysing the data were used. Firstly, analysed and looked at strings and patterns in the classifications. Secondly, compared connecting strings and patterns crosswise over classes and thirdly, this research work was situated with respect to previous research and was critically analysed with those concerns that had been raised by more extensive literature during the review. These three layers were not separate, but rather were interlocked and iterative all through the synthesising procedure. In light of the analysis and union, the research continued and considers the more extensive implications of it. Toward this end, conclusions were drawn and recommendation developed in accordance to the discovery.

Digital Preservation

All the ten participants indicated that the technology becoming obsolete is one of the major problems that preventing the permanent implementation of a solution for digital preservation. Overwhelming majority of the participants raised issues on the increasing demand for storage and needs for appropriate backups for disaster recovery, in order to achieve digital preservation over time. About half or 50% of the participants mentioned the need to address the miscommunication of digital preservation, especially to increase financial support for digital preservation projects. All participants emphasised the need for continuous development of technical skill in terms of technological design and implementation by working closely with technology experts.
Cataloguing Metadata

All participants indicated that the current metadata standards are not sufficient in providing good patron experience. 60% of the participants believed that large, complex standards and widely varied naming practices are the major obstacles for building a better metadata infrastructure. 40% of the participants believed that there is a lack of quality control in the usage of current metadata. The majority of the participants raised concerns regarding the current metadata automation processes in terms of quality of the metadata generated for e-publication. The main concern is the insufficient level of information. The majority of the participants emphasised the need for a single open source language to improve metadata design and implementation for easier integration and interoperability. Illustrative citations are included from meeting transcripts in an endeavour to depict distinct viewpoints and capture the broad and multifaceted nature of the topic. Where suitable, third party information is woven in along with interview data to clarify and solidify the discussion. The main findings and the analysis is presented below with the excerpts from the collected data.

Finding 1: ten participants indicated that the technology becoming obsolete is one of the major problems that are preventing the permanent implementation solution to the digital preservation.

The primary and predominant finding of this investigation is related to the continued development of technologies used for digital preservation. This is explained by the fundamental reliance of e-publications on technology and their being machine subordinate. It is impractical to access/use electronic materials unless the supporting hardware and appropriate software that make it respond intelligibly to user requests is available. Unlike traditional books, e-publication archiving requires active maintenance to overcome rapid dating of the technology led by the innovative change and its adoption by the e-publishing industry.

For a century we have save books, photos, maps and other sources of mileage. Digital asset are just as valuable. Traditional sources of information preservation can survive for years, decades and even centuries, but digital items are fragile and require special care to keep them usable. The fact that you cannot pick up a video/audio CD to see what is on it; this dependence put digital contents at great risk. The smallest error of software, machine or human could harm digital items and result into complete loss of important assets. The rapidity of technological changes seriously affect digital preservation, often leads to incompatibility, as new technologies appears the older ones become obsolete and make it difficult to access all the contents. If you try to access important digital documents then you can’t, it is gone forever, or what of if computer hard-drive failed and lost valuable documents? (Houston)

The technological advances in the past decade, which were pointed out by the majority of the participants include the supersession of 5½ inch floppy disks by 3½ inch ones and the numerous new software packages developed in the mid-1990s. Many of the software packages have now been scrapped and became unusable due to lack of support or maintenance. It is similarly hard to record contextual analyses concerning specific technological issues that has happened in the past, for example, where there is a vital data loss, most institutions are hesitant to announce their errors or explain how it happened. Therefore, a whole area for discussion must open for experts to analyse and recommend best practices for avoiding such situations in the future as well as the lessons learnt from unsuccessful experiences in the past.

The media on which e-publications are being kept is regularly temperamental and its dependability decreases over a period. The severity of this can be increased by using inappropriate storage conditions and administration. The subsequent bit decay can keep records from rendering accurately if by any stretch of the imagination; this can happen with no notification and only in a couple of years, sometime less, of the media being created [Anne & Mark]

The problem of technological advancement puts pressure on the development and publication of electronic resources too. Publishers and content developers have to be aware or potential problems that the preservation communities may face over time. Leans (below), describes the issues very effectively:
Technological obsolescence is frequently viewed as the specialised technical threat to safeguarding e-publications: as technological innovation continues, it turns out to be progressively hard to get content created and with intention to retrieve them back again on older platforms. It is related to long time thinking, but thinking about the moment, it is necessary to think about everything from media trustworthiness and bit decay to computerised rights administration and metadata. Specialised arrangements and procedures are obliged to guarantee our computerised materials to be dependably available today, tomorrow, and for eras to come (Leans).

Each member depicted their recognition that technological obsolete needed to be addressed first in order to achieve a better and sustainable digital preservation. Among the strong comments brought up during the interviews were those from Houston: “Absolutely, I think that technology obsolescence and ensuring that the file itself is future proofed as much as possible are absolutely key to digital preservation”. Similarly, the comments from Anne and Mark further corroborated this view:

“The fragile nature of all currently available storage media does not encourage digital preservation sustainability”. Leans goes one step further saying that: “we must have the capacity to proactively deal with our reaction to change in technology crosswise over numerous eras of innovation”.

The above suggests that the issue of technological advancement and dating of technological solutions is highly significant and is voiced in unison by all of the interviewees – becoming a major challenge for achieving a permanent solution for digital preservation. This result is features particularly strongly as shown by the quotes from the interviewees.

Finding 2: Overwhelming majority of the participants raised issues on the increasing demand for storage and need for appropriate backup for disaster recovery, in order to achieve digital preservation over time.

The majority of the participants were concerned with the ever increasing demand for storage and in a way seen this as a subset of the technological obsolete issues, hence related to the Finding 1. Participants expressed the need to reinforce the data backup facilities, however the difficulty to achieve this is due to financial constrains required for implementing appropriate backup solutions. Guaranteeing the preservation of electronic resources requires considerable investments in technical infrastructure and time/human resources. Yet, members stated that backup is only a part of preservation, and not preservation itself. It is a false assurance to think that data records are safe because they are available in multiple copies. However, typical storage media, such as the suggested fast magnetic tapes or disks, are still subject to damage from such perils as electromagnetic fields. Electronic media, similar to the materials that make up physical texts, is also at risk of corruption or degradation. This is colloquially known as the “bit rot.” Three of the members suggest that making use of cloud computing could help resolve the storage issues, while they also pointed out that this however, posed another issues of ownership of resources, imminent lack of expertise and other risks. The implementation cloud storage is still very novel and the solutions may introduce yet to be identified risks to preserving e-publications.

Finding 3: Half of the participants mentioned the need to address the miscommunication of digital preservation, especially to increase financial support for digital preservation projects.

Many participants indicated that there is a need for a common language with regards to digital preservation in order to clearly distinguish it from an ordinarily digitalised media. One of the interviewees, Toks, even emphasised that “the clear understanding could help, especially to increase financial sponsors for digital preservation project, cost is one of the restricting factors, resources are never enough in this world we lived in then there is need for leveraging to meet the demand for the areas of important or essential for life”. Most members indicated that most patrons believed that digitalisation is synonymous to preserving e-publication, as long as they are still available without thinking of their accessibility in the future. The remaining 50% of the interviewees argued that the miscommunication is not a major problem. Namely, patrons who often misinterpreted digitalisation for preservation, should not necessarily know much about the technical aspect of the implemented solutions. They emphasise that this is the responsibilities of the archival services and those who are responsible to implement the changes/solutions and put them into practice.
Finding 4: All participants emphasised the need for continuous development of technical skill in terms of technological design and implementation by working closely with technology experts.

All participating interviewees have expressed a common concern for the need in reskilling the librarians and archivists or record managers. The acquisition of advanced technical skills in the design of necessary solutions are required to established digital preservation and improving quality of implementation of the currently available solutions, even if they are not sufficient. Librarians and archivists who are active researchers will be of great help too, as conducting research in the field and being fully informed about the recent developments can be crucial for putting the existing knowledge into practice. It is not just a training that librarians need. The Librarians must make to believe and accept that this is an important part of librarianship career, and seeing it as one of the ways to overcome preservation and other challenges library are facing. By focusing on continuous technical training will help librarians to be part of the solution finding group (library and information science researchers) in order for library to continue to meet the patrons’ demand now and in the future. Some interviewees stated that librarians do not know enough about what researchers do or achieve. As a result the researchers often do not think that custodians can be of much help in their work, and if training can focus on archivists/librarians’ understanding of various aspects of preservation research, the practitioners can further explore existing knowledge and adapt more suitable solutions for preservation. Using practical and active learning is believed to be central to that kind of leaning approach, for example, by using realistic case studies, inquiry-based and problem-based learning. The topics should attempt to link activities from a range of roles librarians could take. It became apparent from the interviews, that there is currently more emphasis on practical training, which focuses on the skills needed to support future projects and institutions. Some of the quotes from the participants of the interviews describe the issue strongly. For example, Kevin indicated that:

“One of the biggest difficulties has been educating librarians the right skill-set to acquire. However, technical skills are required such as storage and knowledge of data repositories”.

The right skill-set acquisition was also mentioned by Sarah and Marvin. While Ms Paris said that:

“The five major areas: data research, research process, scholarly communication, partnerships and metadata, are essential skills for the current and next generation of archivists/librarians”.

Douglas indicated:

“based on my experience librarians rarely have time for attending long training courses, because having time and motivation is equally important to providing the required training”.

Sarah also added that:

“Digital preservation is a relatively new region for the advanced education part and institutional administrations are regularly still being developed. It may not simply be a matter of finding out around a current archive framework or how to advance an administration, now and then these frameworks don't exist yet. It can be hard working in a setting where the institutional bearing is indistinct. In view of this a considerable lot of the decent number of curators will be glad to learn with a specific end goal to respond to the challenge ahead”.

The interview, therefore, highlighted the need as well as the types of training that librarians may need to further improve the work they put in in the area of preservation.

Finding 5: All participants indicated that the current metadata standards are not sufficient in providing good patron experience.

All interviewees acknowledged that the current metadata standards are insufficient and mentioned that the users expect fast and easy information retrieval and immediate access to materials. Despite the fact that metadata creation is costly and labour intensive but the danger of invisible materials is higher.
Some of the problems that have been pointed out by the interviewees as ongoing issues in the libraries today on digital materials are: a) limited or no access to materials, b) delays in users access to high-demand materials, and c) lack of collections analysis, selection and proper reporting. Some interviewees also pointed out that understanding the need of the users will be very much helpful in designing and implementing a better solutions, that could improves users’ experience when searching for a digital resources. Metadata is meant to provide useful information for the users by given clear differences between two similar or dissimilar items, which can be made possible with full text databases, where users can do all kinds of searches and analyse the texts themselves and make decent decision. Otherwise, users are just being forced to choose texts/resources based on information that means nothing to the users. As Kevin points out: “There might be a need to modify the functional requirement for bibliographic records, to enhance metadata.”

Sarah explained that:

“Metadata is used for two fundamentally different concepts. Structural metadata is about the design and specification of data structure and is more properly called data about the containers of data; descriptive metadata, on the other hand, is about individual instances of application data, the data content. Metadata is traditionally found in the card catalogues of libraries. As information has become increasingly digital metadata are also used to describe digital data using metadata standards specific to a particular discipline. By describing the contents and context of data files, the quality of the original data/files is greatly increased”.

According to another respondent, Anne:

“Without context and a point of reference, it might be impossible to identify metadata just by looking at them. Library metadata have been used in various forms as a means of cataloguing archived information. Library traditionally catalogues used 3x5 inch cards to display a book’s title such as, the author, subject matter and a brief plot synopsis along with an abbreviated alpha-numeric identification system which indicated the physical location of the book within the library’s shelves. Such data help classify, aggregate, identify, and locate a particular book. It’s even more important to streamline metadata processes and to able to share metadata really quickly”.

The interviewees further identified that there is no single or set of metadata creation workflow standards available. Even though there are metadata standards existing such as Dublin Core and other available standards are often used for projects, the fields were being diversely translated for every metadata project implementation, as workflow standards were not developed. Some of the interviewees mentioned that cataloguers have a good experience in administrating metadata standards designed to allow the efficient of objects retrieval for example, MARC, and in creating metadata, such as catalogue records. For example, Marvin stated:

“Metadata creation is an extension of the cataloguers’ existing knowledge, skills and abilities. As such, it should be embraced and supported.”

Ms Paris also added:

“Cataloguers recognise the significance of controlled vocabulary and its link to keyword searching and data retrieval.”

This view is supported by Douglas:

“Cataloguers’ skills along with the capability to create standards, classification systems and vocabularies, these abilities can be transfer to the creation of metadata”

Some of other metadata areas of focus mentioned are on breaking down the barriers between metadata used for acquisitions and metadata used for discovery. Improving library business intelligent and collection management systems are equally important. For the library becoming more involved in upstream metadata creation processes, integrating available metadata into standardised workflow upstream and allow the metadata to evolve over time. Interviewees added that solutions must be
interoperable and easily shared, both inside and outside the library community. Indicated that library
community must extend expertise, including cooperative and collaborative practices, to include
publishers in order to be able to leverage library data including terminologies and classification, though,
publisher part is beyond the focus of the dissertation. Interviewees further indicated that finding ways
to create, accept, and share multiple types of metadata. And some emphasises that libraries must
become more open to the use of non-MARC data and also accommodate non-library vocabularies.

**Finding 6:** 60% of the participants believed that large, complex standards and widely varied
naming practices are the major obstacles for building a better metadata infrastructure.

About 60% of the participants emphasised the fact that all these different standards proprietors are
more interested in the return on their investment that with this motive there will always be a problem in
order to continue being in business; because if there is no problem, there is no need for a solution.
However, if it is at community level, more caution will be made in order to judiciously managed public
funds.

**Finding 7:** While 40% of the participants believed that there is a lack of quality control in the
usage of current metadata.

It was observed that 40% of the interviewees have argued that improving the quality control of the
currently available metadata could bring great changes, in contrast to the 60% of the interviewees in
Finding 6. Some of the recommendations brought forward are: reducing the manual manipulation of the
existing metadata and increasing the automation processes and testing to ensure quality is achieved.
It is not viable to efficiently and effectively manage an enormous resource manually that is being
acquired by the libraries, which continues to grow. And allowing different levels of metadata based on
types of material and users need, which could improve the users’ searchable access to e-publications.

**Finding 8:** The majority of the participants raised concerns regarding the current metadata
automation processes in terms of quality of the metadata generated for e-publication. The main
concern is the insufficient level of information.

The majority of the participants have raised concerns on machine-created metadata and believed that
more extensive research within such disciplines is still highly required as computer and information
sciences, including data mining and artificial intelligence are still evolving, and there are lots to be
learned in order to be able to trust machine-generated metadata, even if it is trusted to do it at this
stage, will require ad-hoc testing to verify some of the important fields. Then again, we have not yet got
to the level where machines can handle all metadata required to uniquely identify digital resources.
Human insight are still needed or and creativity can include such areas as subject classification,
educational attributes and determining the contributors to a resource.

**Finding 9:** The majority of the participants emphasised the need for a single open source
language to improve metadata design and implementation for easier integration and
interoperability.

Again majority of the interviewees have pointed out that the solution to the challenges posed by
metadata and digital preservation issues are not purely because of lack of knowledge in implementing
a lasting solution, but because of the fact that there are lots of wasted and duplicated efforts, which
should have been concentrated on a single database where everyone can pull from, and with collective
effort we can achieve a better working solution. Some of the interviewees’ quotations illustrate this. For
example while Anne recommended that:

> “having one database that everybody can pull from could be one possible solution which
can help eliminate duplicated effort, but this also posed another issues especially, on save
guiding proprietary data. Because is not just about money in selling digital resources, there
is money in the data itself and some product and services are purely based on that data
and the proprietary quality of that proprietary data. Then there is difficulty of sharing
information and then there is a need to have a really good case, I think convincing
everybody’s return on investment might make it possible. Preferably, I will like it to be a
non-profit and industry-wide [...] there is a project like that already working on by the Australia and the New Zealand, but how they are doing it I don’t know”.

Houston also supported:

“I tend to believe that metadata infrastructure and storage solutions should be publicly own through public effort; to secure public money through the emphasis on the metadata for preservation of educational resources for further learning and collective history is important. Although how this would be achieved in the current climate is difficult to say.”

Analytic Category Development

The findings the emerged from this research was used to develop the categories based on the original research questions. After carefully looking into the Data Summary Table, it was revealed that Finding 1, speaking about the obsolete technology and Finding 2 that indicated the storage concern, speaks to each other, which merged both into category 1, thus titled “Technological Impact”. The perception about the miscommunication in Finding 3 and Finding 4 in regards to the technical training needs of the librarians and archivists have a bit of close correlation for the fact that both related being informed though, these applied in different direction. However, it formed the category 2 due to the purpose of both findings not the direction, and titled “Enlightens and Coaching”. Finding 5 about insufficient metadata relates to Finding 6 with reference to current metadata standards complexity, Finding 6 is in relation with Finding 7, as both presents the contrast between the interviewees, and while Finding 7 speaks to Finding 8 as both is pointing direction to quality implementation and management of cataloguing metadata, therefore, titled “Ensuring Quality in Metadata Implementation, Design and Management”. While Finding 9 formed the category 4 and title; “Libraries Alliance and Forming a Community”. Therefore, the analytic category are breakdown as follow, 1) Technological Impact, 2) Enlightens and Coaching, 3) Ensuring Quality in Metadata Implementation, Design and Management, and 4) Libraries Alliance and Forming a Community.

Technological Impact

The first research question in this research was to find out what can be done to address technology obsolete problem and how it can be applied. In light of this research question, enquiries was made from the expert through the interview and all participants had confirmed that technology obsolete is the greatest enemy debarring achieving permanent solution to digital preservation. The participants acknowledged that the information system/technology is rapidly advancing field, with new and improved technologies regularly developed. As new products are brought to the market, previous products often cease to be supported or with limited support. The lifespan of a given technology is typically very short – perhaps five to ten years. A major challenge of digital preservation then lies heavily on keeping up with the method for access to electronic media despite fast technological obsolescence. Also, storage media are vulnerable to alteration, damage and rot over short timescales. The potential issue of information should likewise be alleviated, because maintaining access to electronic media in itself is insufficient. One of the interviewees, Mark, reverberate this perspective when he expressed that, “there a need to solve technology obsolete first, once this is achieved, then preservation is seventy percent close to it solution”. While paying close attention analysing the trends, patterns, contrast and relationship in between, it has been identified that to make digital preservation sustainable, there is a need to ensure enough flexibility to evolve along with technology advances.

However, Ms Paris mentioned that “lots of approaches have been recommended in the part, but none seems to be working, instead they are only an increase to the cost constraint”. Though, she did not specified those approaches that have been recommended in the past, but Anne comment correlate with Ms Paris statement, when she said “continuous migration approach and others recommended by some expert are inadequate solution, an industry-wide, non-profit solution will be better off and can be able to do more and eliminate duplicated effort”. In review to understand what are “others’ approaches are, Rothenberg (1999) reported that reliance on standards, computer museum and migration, only play a role, none of these approaches provide solution required by itself neither in their mixture. Rothenberg recommended that a perfect approach should allow single, extensible, long-term solution designed once and for all and applied uniformly, automatically, and in synchrony (for example, at every future refresh cycle) to all types of documents and all media, with minimal human intercession. In summary, it has been acknowledged that achieving sustainable digital preservation requires solving technology
obsolete first. Though, some solutions have been recommended in the past but none is suitable for the purpose, and now, the alternative is a single solution for all is ideal.

**Coaching**

The second category base on the third and the fourth research questions on the list, which was the miscommunication of digitalisation to preservation and technical training needs for the librarians/archivists. It is glaring based on the data summary table analysis, where 20% of the interviewees were fairly in support of the need to address the miscommunication of most stakeholders, while 30% have seen as been very important, especially to increase financial support for digital preservation projects. It became clearer that Category 1 speaks to Category 2, to that fact that single solution been recommended as an alternative to previously inadequate recommendations, will require all stakeholders who will be supporting and sponsoring such idea, to be well enlightens on what digital preservation is, the purpose of making it sustainable, and what are the benefits to all stakeholders. Likewise, it is evident that all the interviewees, have clearly indicated the need for further training for the librarians/archivists and technology experts, in order to obtains the require skills needed for solving technology obsolete and achieving sustainable digital preservation.

**Ensuring Quality in Metadata Implementation, Design and Management**

The perception of all the participants in this research indicated that the current metadata standards are insufficient and did not provide library users with better experience when searching electronic publication. The findings revealed that users are not given the full benefits of using e-publication, because of the library functional requirement for bibliography record are still based on the traditional format, hence, there a need to modification, by allowing the users to do all kind of possible searches and analysis before making informed decide on what material(s) to be checked out. Without a sufficient and appropriately implemented metadata in place, it is evident that accessing e-publications might be a nightmare. This was reflected when Lagoze *et al.*, (2006) stated that regardless of the possibility, even if every other parts of a digital library would work faultlessly, ineffectively used metadata would degenerate the library services. In addition, an interviewee, Anne said: “without context and a point of reference, it might be impossible to identify metadata just by looking at them”.

The Finding 6 revealed that 60% of the participants argued that the large, complex standards and widely varied naming practices are major obstacles for building a better metadata infrastructure. Further evidence indicated that all interviewees accepted that current metadata standards are insufficient, which can be argued that the rest of 40% of the participants indirectly agreed with the 60% who believed the metadata vendors are the major obstacles, because the current insufficient metadata standards all participants agreed to are majorly built by these vendors, held responsible. It was revealed based on the trends, patterns, contrasts and relationships in-between data summary table interviews analysis, the 40% who argued that is quality control lacking in the current metadata implementation standards, are emphasising on the fact that with quality control in place, a lot more can be achieved through it, despite the standards are insufficient. Also, the Finding 8 is closely in relationship with Finding 7, as they are both emphasising on the quality assurance when implementing and managing metadata infrastructure. The concern of the majority of the participants revealed in Finding 8, is to ensure that machine-generated metadata should be subject to further testing, to validate that they are conformed to the set standards. Furthermore, the Finding 8 also related to the Finding 5, because 30% of the interviewees related the deficiency in the standards to lack of design and implementation workflow standards, to ensure quality control across implementing institutions on every project, and when participants strongly recommend modification to the existing functional requirement for bibliography record. This was further reflected when Marlin mentioned, “When the foundation is corrupt, what can the righteous do?” If the functional requirement for bibliography record is not meeting the current needs of the users, and metadata standards are being built to accommodate it, obviously, it will forever be wrong if not back to the root of the problem to start resolution from there. Therefore, quality control is among trends participants emphasised on. Clearly indicated during the interview analysis that, quality assurance and control is important right from the functional specification, to designing and implementation and highly recommended paying attention throughout the overall management.
Libraries Alliance and Forming a Community

Based on Category 1, where vast majority of the participants indicated that none of the previously recommended approaches have been able to resolve the technological obsolescence issue, on which the sustainable achievement of digital preservation relied. Followed by the participants concern on the increasing demand for storage and need for appropriate backup for disaster recovery. It is clearly expressed based on the data summary table for interviews analysis, 60% of the interviewees discouraged reliance on the individual, private or corporate storage facilities. And majority of the participants further pointed out that backup is only a part of preservation, and not preservation itself. Based on that, the emphasis remained on making the e-publication materials future proof, to ensure access over time. Also the Category 3, further indicated that 60% of the interviewees have recommended community cloud, that by encouraging this will eliminate technology experts duplicated efforts, and the haggard energy can be spend improving single solution, which will eventually be more reliable than corporate owned cloud. Houston further reflect on this saying, “corporate storage solutions (the cloud, or other services provided by private companies) are flawed because that storage will not be perpetual”; although Houston said in the interview, that how to achieve community based solution in current climate is difficult to say. While 40% believed that corporate cloud is better solution in order to shift cost, especially the overall maintenance. Therefore, libraries alliance and forming a community, is the ideal alternative solutions inherent while analysing the patterns using data summary table in Category 1, 3 and 4. It is important to revisit the objectives, which are the foundations for this research that were stated prior to embarking on this study. These objectives were introduced at the beginning of this study and were based on the initial background research. Discussions on these six fundamental objectives are next in light of the analysis of this current study’s discoveries.

The first assumption was to examine, how the preservation of publications has changed with the development of e-publishing and the impact of these changes on libraries. The emerged Finding 1, answered this question, which have indicated that the development of e-publishing has posed libraries with new challenges, as the preservation needs for e-publications is different to the traditional form of preserving the paper counterpart. The impact of these changes has resulted in continuous struggle with the technology obsolete and challenged with how to provide the increasing demand for storage, backup and disaster recovery. Second assumption to examine the evolution of libraries since the adoption of electronic publications by libraries and to examine the benefits and disadvantages of this evolution to date, this was not part of the emerged finding, but discussed during the critical review of literature. Third assumption was to identify and evaluate the challenges of digital preservation and cataloguing metadata issues, which the libraries are facing in the digital age. The emerged Finding 5 has provided the answer to this objective. Fourth assumption was to identify the ways in which libraries can improves cataloguing metadata of different types of electronic publications including web contents. The emerged Findings 5, 6 and 7 partially answered this assumption. This research has not uncovered specifically on how different types of electronic publications neither the web contents. However, generic ways in which libraries can improves metadata was identified in those Findings specified earlier in this paragraph. Fifth assumption was to identify the avenues for libraries in fully designing and implementing a robust cataloguing metadata standard. This was answered with the emerged Findings 5, 6, 7, and 8. The final sixth assumption was to make recommendations towards improved and more sustainable digital preservation of electronic publications.

Conclusions and Implications

The conclusions of this study are based on an investigation embarked upon for addressing the initial research questions and objectives. The emerged findings synthesise four research directions: (1) how the preservation of publications has changed with the adoption of e-publishing and the impact of these changes on libraries; (2) evaluation of the challenges of digital preservation and cataloguing metadata issues that the libraries are facing in the digital age; (3) ways in which libraries can improve cataloguing metadata; and (4) the avenues for libraries in achieving sustainable digital preservation and fully designing and implementing a robust cataloguing metadata standard.

The impact of technology on digital preservation was the first main finding of this research. All the interviewees that participated in this research indicated that technology obsolescence is a “specialised technical threat” as described by an interviewee, Leans, who highlighted the need for resolving the unavoidable outdating of technology in order to achieve a sustainable digital preservation, in line with
the way it has been achieved for preserving paper based counterparts. In relation to technology becoming obsolete, the overwhelming majority of the interviewees raised concerns about the increasing demand for storage and backup for disaster recovery, and successfully meeting the increasing storage needs, which will further strengthen sustainability of digital preservation. However, it is clear that all the available storage media are vulnerable and susceptible to bit rot and thus cannot guarantee the availability of the stored content being retrieved in the future. Likewise, the mitigating solution of this is having a backup plan in place. This mitigation plan however, is not a guaranteed solution either, as it inherits the same vulnerable nature of the technologies. Furthermore, it is not at all cost effective and in contrast, it only increases financial burdens of every institution.

The common perception that storage is currently very cheap led to a belief by other researchers, but after reviewing the research conducted by Wright, et al., (2008) it becomes clear that the situation is not that straight forward. While Wright confirms that storage is becoming cheaper by fifty-percent every eighteen months he highlights that there are two sets of significance effects, which are: 1) the cost of energy power usage, cost of storage space, the cost of cooling for it, general management and the cost of replacing the storage remain significant, in order to ensure reliability, integrity, and usability; and 2) the abundance of storage leads to a demand for more storage space. All of these still make private storage provision non-cost effective. Therefore, the same recommendation applied to both, the outdated of technology and the increasing demand for storage and backup plan, are having a similar impact on digital preservation, as they are both technologies in the same context. The conclusion on both of the challenges are based on the evidence from the analysis of the interviews conducted with the aim of identifying trends, patterns, contrasts and common relationship. The analysis revealed that a permanent solution to the technological problem could resolve 50% of the issues related to coming up with a digital preservation solution. Subsequently, it emerged from the interviews that combining an effort for building a single database that everyone can pull from, has been the best recommended solution in this study for supporting the digital preservation in the future. A related conclusion is that, it will help to build a robust metadata infrastructure.

Another related conclusion that became apparent from the study is the need to modify the functional requirements of bibliographic records for enhancing metadata standards, particularly with regards to metadata design workflow. Having the metadata design workflow in place will ensure that the new solution will improve patrons’ experience with regards to having a better searchable access to digital resources, and as a result, will eliminate the current issues of: a) limited or no access electronic materials, b) delays in users’ access to high-demand materials, and c) lack of analysis, selection and proper reporting in collections. It was also identified that bringing the cataloguers together when designing and implementing such a single solution and by transferring the metadata creation possess will greatly support overcoming the current cataloguing metadata issues that the libraries are facing in the digital age. An additional conclusion is that the single database solution will help overcome with problems with interoperability. Having a single database, as described above, is highly likely to eliminate the wasted effort of individual institutions which are trying to achieve this independently. However, additional research is needed to understand: how to achieve it, the selection of the standard to be used or followed, the cost and benefits model to adopt, how to convince everyone to support this type of a project, the issues of ensuring privacy and security when establishing such a community and, finally, how to encourage the industry-wide adoption of the solution. Currently, as it became apparent from the interviews, the major issue is that most interviewees do not have specific directions on how this can be achieved. Many of the interviewees shared the view of Houston, who stated the following during the interview: "how this would be achieved in the current climate is difficult to say".

This research also revealed that before embarking on the recommended solution, there is a need to address the miscommunication among stakeholders, especially to increase financial support for digital preservation. Furthermore, if libraries are going to form a community, either at national or international level, to build a non-profit and industry-wide single database, as mentioned by the interviewees, will require some financial support and without money, it is impossible to achieve this aim. Additionally, to encourage the contribution towards a common project, there must be a clear understanding of the benefits that such project will provide. Therefore, addressing the miscommunication in the field of digital preservation becomes a crucial task that must be achieved prior to advancing with the development of the solution. The results of the interview suggest that technical training is required for the librarians/archivists and content developers. The library experts will need to update their skills in order to be able to meet the needs of the sectors, and working closely with technology experts becomes very important. Some of the training recommended by the interviewees are: partnership and metadata
implementation, and repositories management. This recommendation is in line with earlier reviewed literature. Based on the journal article, conducted by Choi & Rasmussen (2006), in which 48 professional librarians participated, there is a need for training on the subjects highlighted below (see Table 1). The alternative solution, elicited as a result of this research, is the use of an emerging cloud solution, as recommended by some of the. The cloud-based solution is readily available now, compared to the recommended single community database. However, some of the participants argued that reliance on it is dangerous, as it cannot be trusted. Nevertheless, it may be perceived as a better alternative to implementing an institutional private cloud infrastructure due to heavier cost constraints on individual institutions. One should bear in mind, however, that neither of the solutions are guaranteed to be future proof. In summary, before the recommended solution comes into existence, the current metadata standards, which are insufficient, can still be improved by embedding high levels of quality control through the metadata management lifecycles. Additionally, machine-generated metadata should not be totally relied upon, and therefore, a further form of quality check on the generated content is necessary to ensure data integrity.

<table>
<thead>
<tr>
<th>Technology:</th>
<th>Library-related:</th>
<th>Others:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL architecture and software</td>
<td>The needs of users</td>
<td>Communication and Interpersonal Skills</td>
</tr>
<tr>
<td>Technical and Quality Standards</td>
<td>Digital Archiving and Preservation</td>
<td>Project Management/Leadership skills</td>
</tr>
<tr>
<td>Web Mark-up Languages</td>
<td>Cataloguing, Metadata Indexing</td>
<td>Legal issues</td>
</tr>
<tr>
<td>Database development and Management Systems</td>
<td>Collection Development</td>
<td>Grant/proposal writing skills</td>
</tr>
<tr>
<td>Web design skills</td>
<td></td>
<td>Teaching and Group presentation skills</td>
</tr>
</tbody>
</table>

Source: Choi and Rasmussen (2006)

The study have not been able identify the ways in which libraries can catalogue each types of electronic publications such as e-journals, e-books, e-magazines, web content and others. Due to the limited time constraints and the breadth of the area under study, providing recommendations to address these challenges were impossible. Additionally, the study was unable to make inquiry into the users' perceptions on the current services offered by libraries with regards to e-publications. However, some of the views about the possible user perceptions were captured from the interviews with librarians. These recommendations include the affordances of conducting a full database search and analysis to avoid checking out less relevant items. Finally, while the sample of the interviewees was rather large, the research could have benefited from interviewing more experts from localities which were not included in sample. The future work, should address the limitations highlighted above. It should also look into the ways in which libraries can catalogue each type of electronic publications such as e-journals, e-books, e-magazines including web content. Research into the usability and usefulness of technologies used by the libraries can be another research direction that could further extend the understanding the performance of the libraries with regards to e-publications. Continued research on the concept of identifying and implementing a single database solution at a national or international level would also be beneficial.
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Exploring ICT adoption by SMEs in southern Africa

Knowledge Mpofu and Sinfree Gono

Abstract

The main objective of this paper is to critically explore the inter-relationships between ICT adoption factors in the small firm sector in countries of southern Africa. The paper draws and builds on previous research that focused on issues related to ICT adoption process among SMEs operating in South Africa, Botswana and Zimbabwe. The ICT adoption theories derived from the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) underpinned the investigations in previous work, which highlighted the influence of several key factors that include Government role, Environmental, Social networks, Technological, Organisational and Owner-manager (GESTOO). The results based on over 60 semi-structured interviews with participants from case studies in the small hotel industry in South Africa, Botswana and Zimbabwe highlighted the influence of several key factors that include Government role, Environmental, Social networks, Technological, Organisational and Owner-manager (GESTOO) on the ICT adoption process of SMEs. However, the initial results of the study could not explain the inter-relationships existing between the identified ICT adoption factors. In another study, a total of 130 small firms surveyed from both logistics and manufacturing sectors in Johannesburg (South Africa) and 52 interviews carried out mostly with owner-managers, the survey results also showed the influence of technological, organisational, owner-manager and environmental (TOOE) factors in the ICT adoption process and use in SMEs.

Keywords: ICT adoption, SMEs, inter-relationships, southern Africa

Introduction

Despite the growing number of studies on the adoption of information and communication technology (ICT) in small and medium sized enterprises (SMEs), the existing literature still suggests the need for advancing understanding of the key factors experienced in different contexts around the world. In addition, this area of study is still under-researched in African contexts. ICT is defined as ‘any technology used to support information gathering, processing, distribution and use’ (Beckinsale and Ram, 2006). The definition taken in this paper classifies ICT into information technologies, telecommunications technologies and networking technologies (Nicol, 2003). This covers all forms of technologies such as computers, Internet, websites as well as fixed-line telephones, mobile phones and other wireless communications devices, networks, broadband and various specialised devices (Manueli, Latu and Koh, 2007). From a stream of ICT literature that focuses on the small firm sector, this research takes the ICT adoption approach (Beckinsale and Ram, 2006; Zappala and Gray, 2006; Manueli et al., 2007) to advance the understanding of technology uptake among small businesses in developing nations within Southern African Development Community (SADC). More specifically, the main objective of this paper is to critically explore the inter-relationships between ICT adoption factors in the small firm sector in countries of southern Africa.

The study draws and builds on previous research focusing on issues related to ICT adoption process among SMEs operating in South Africa, Botswana and Zimbabwe (Mpofu and Watkins-Mathys, 2011; Gono, Harindranath and Ozcan, 2013). The investigations in this paper are underpinned by a theoretical framework which draws together several key ICT adoption factors that include government role, Environmental, social networks, technological, organisational and owner-manager (GESTOO) attributes. These key factors are integrated based upon their significant influence on ICT uptake and prevalent usage by several researchers (Gray, 2006a, b; Beckinsale and Ram, 2006; Gibbs et al., 2007; Ritchie et al., 2005; Brown and Licker, 2003; Scupola, 2006). The theoretical foundation of these ICT adoption factors is largely derived from Davis’s (1989) technology acceptance model (TAM) and Roger’s (2003) Diffusion of Innovation (DOI) theory. This paper integrates and presents results from survey data collected from small firms in the logistics and manufacturing sectors in Johannesburg (South Africa), and the perspectives of participants drawn from the small hotel industry in South Africa, Botswana and Zimbabwe. In this way, the findings provide insights which help to inform both policy and practice from the perspective of SMEs in these countries of southern Africa. The selection of small firms
in different sectors help to enhance understanding of the ICT adoption process, including the distinctive and behavioural characteristics of SMEs through cross-case and cross-national comparisons. In addition, the paper helps to bring new insights that help to inform policy-makers and owner-managers on ICT adoption issues in the small firm sector from a relatively under-researched southern African region. To this end, the results provide highlights that contribute to literature and further understanding of the inter-relationships between ICT adoption factors based on the experiences of SMEs, particularly in southern Africa, and more generally from perspectives of developing countries.

**Behavioural Characteristics of Small to Medium Sized (SME) Firms**

This section presents the definition of SMEs adopted in this paper. The section also provides a critical evaluation of the distinctive and behavioural characteristics of SMEs in relation to their capacity to influence ICT adoption process. The definition of SMEs varies in different economic contexts around the world. This paper takes the one used in South African (PNC on ISAD, 2004) and the European Union (EU) classification (Curran and Blackburn, 2001; Verheugen, 2003), which categorises small, medium and micro enterprises as having an upper limit of 250 employees. In terms of the distinctive and behavioural characteristics, SMEs are more likely to experience several ICT adoption and implementation challenges given their relatively small sizes; ownership structures; lack of access to resources and capacity to view ICT strategically (Beckinsale and Ram, 2006). Such distinctive characteristics of SMEs are linked to other several factors which may facilitate or inhibit ICT adoption in the small firm sector, as highlighted in the subsequent sub-sections.

**Role of Government**

Based on existing literature, ICT adoption in SMEs can be driven or inhibited by government intervention, which is also viewed as an external source of pressure apart from the suppliers, customers and competitors. Government’s primary role is to articulate vision and policy (Howell and Terziovski, 2005), as these are considered the two development drivers for any regional or national ICT development initiatives to promote e-business among SMEs. The role of government is viewed as a leader and facilitator in technology adoption. A facilitating government works with other stakeholders to leverage resources. In view of these roles, the government is therefore crucial as a standard setting and knowledge dispersing body (Seyal and Rahman, 2003). According to Howell and Terziovski (2005), weaker SME demands for intervention and support for ICT adoption and development of e-business may indicate that policy-makers are playing more of a leadership role whereas stronger needs for support and ICT access may indicate that policy-makers’ role could be more facilitative. If there is a strong demand for ICT in any given business environment, SMEs and the broader community are likely to adopt ICT as initiators, centres of influence or champions of change. Smallbone and Welter (2001) argued that “direct support measures are not the main role for government.” Government is expected to create the framework conditions for private sector development with a view to supporting the growth and sustainability, particularly in ICT adoption and development of e-business. Based on survey evidence from the Ukraine, Belarus and Moldova, Smallbone and Welter (2001) suggested that many enterprises could be set up, survive and even grow without government direct intervention. This could be attributed to the commitment and creativity of owner managers (Smallbone, Leigh and North, 1995) in mobilising resources and flexibility in adapting to hostile external environments. However, the source argued that the number of firms could remain small in size and contribution to economic development rather limited under such inhibiting conditions.

**SME owner manager characteristics**

The owner manager characteristics include perceived benefits of ICT adoption; ICT literacy; level of assertiveness in terms of business decision processes, perceived control over requirements for opportunities and resources as well as mistrust of ICT and lack of time (Zappala and Gray, 2006; Van Akkeren and Cavaye, 1999; Manuelli et al., 2007). According to Beckinsale and Ram (2006), the perceived benefits of ICT adoption often include focus on improving business efficiency; operational effectiveness and the need to reach out for new markets and opportunities (Poon and Swatman, 1999; Mehrtens et al., 2001). In addition, the existing theories suggested a strong tendency to adopt ICT in small businesses if owner managers and employees have ICT literacy, skills and expertise. Moreover,
access to internal and external support and motivation from ICT experts is crucial for ICT adoption and e-business success in SMEs (Windrum and de Berranger, 2002). SME owner managers viewed as ‘more entrepreneurial, risk-takers, innovative and invariably creative’ are considered to be critical to the organisational readiness for ICT adoption (Zappala and Gray, 2006; Beckinsale and Ram, 2006). Furthermore, Manuelli et al. (2007) suggested that business action is driven from the key decision-makers responsible for defining appropriate ICT goals and identifying critical ICT business needs and allocating financial resources to facilitate ICT adoption. According to Gray (2006), “SMEs planning to invest are also much more likely to provide training and development to their staff and managers.” The source further suggested that SME owner managers with technical and vocational qualifications are more likely to engage in more innovation activities that include ICT adoption and development of e-business. In addition, the source argued that small business owners with appropriate qualifications and ICT skills are more growth-oriented while those without these prerequisite characteristics are more likely to be growth averse.

Zappala and Gray (2006) investigated factors that distinguish small business adopters and non-adopters of ICT and also confirmed the importance of organisational support of key decision-makers such as owner managers in ICT adoption process. The early adopters also identified as change agents or innovation champions (Poon and Swatman, 1999) and access to financial resources are among the key organisational characteristics that influence ICT adoption in small businesses (van Akkeren and Cavaye, 1999; Manuelli et al., 2007; Gibbs et al., 2007). In addition, Seyal and Rahman (2003) argued that SMEs adopt ICT due to the decreasing cost and availability of software as well as the overall benefits and opportunities brought by ICT adoption. Furthermore, existing literature suggests that age and experience of owner managers are some of the distinctive characteristics which influence on ICT adoption in small businesses (Manuelli et al. 2007; Windrum and de Berranger, 2002). In terms of age, the second generation (youthful) business owners are more likely to be receptive to ICT than their first generation (elderly) counterparts (Beckinsale and Ram, 2006). Clearly, this view carries an assumption that 2nd and 3rd generation (youthful) business owners, born and educated in recent years characterised by advanced technologies and applications in daily activities, have greater awareness of ICT than the 1st generation (elderly) counterparts. However, such studies are mainly looking at developed economies and this view may be different in developing economies such as those found in the SADC region. According to Gray (2006), resources and capabilities of SMEs, which are both linked to the age and experience of owner manager as well as age and size of the firm, are viewed as important attributes for effective innovation and growth (Smallbone et al., 1995). The source argued that SMEs that are oriented towards competition and growth may lack the resources and personal capabilities to adopt ICT and manage growth successfully, perhaps due to age, cultural and educational background of the owner.

**Social Networks**

Social networks of business owners also play a crucial role in driving or inhibiting ICT adoption in SMEs. For example, in communities where culture is viewed as a key factor, particular cultural traits, beliefs and values attached to resources and investment may influence ICT adoption in several different ways (Beckinsale and Ram, 2006; Straub et al., 2002; Yap et al., 1992). In addition, the size and type of social structures as well as the nature of social links and preference for personal friendships and contacts (Beckinsale and Ram, 2006) may have positive or negative influence on ICT adoption in SMEs. In terms of positive influence, social networks are crucial to small business owners for sharing information, business experience and technical knowledge especially if the SMEs are experiencing resource constraints which inhibit ICT adoption, formal training and effective innovation as well as growth (Gray, 2006). Increased ICT adoption and connectivity might be expected to help in developing absorptive capacity and reduce the traditional constraints on the ability of SMEs to innovate, while leveraging their flexibility and responsiveness (Gray, 2006). Internet and website adoption, for example, may help SMEs to participate in useful business and social linkages ‘without a strong need for spatial proximity’ (Gray, 2006). Manuelli et al. (2007) further added that “information filters through the networks and depending on the nature of the networks and the roles of its opinion leaders, new innovations are either adopted or rejected.” Opinion leaders can be the small business owner managers, friends other members of the social network who can explain the advantages, disadvantages and benefits of ICT adoption through personal contact. On the other hand, change agents and gatekeepers include government and private sector representatives. These are viewed as intermediaries who can effectively communicate the benefits of ICT adoption and applications in small businesses (Gibbs et al., 2007; Forman and Goldfarb, 2006). According to Manuelli et al. (2007), change agents and gatekeepers
“deliberately set out to promote ICT adoption to small businesses by offering unbiased advice on the need to adopt ICT and how to go about doing it.”

Furthermore, Braun (2004) argued that some social networks of SMEs are dynamic relationships with ever-changing actors and contextual innovation factors. The findings suggested that understanding the change processes which take place, for example, in tourism networks has the potential to benchmark change, speed up ICT adoption and create effective collaborative network outcomes. While the study provided some useful insights into ICT uptake and network relationships, the researcher suggested the need for further empirical evidence on tourism network research and e-business development, which are some of the aspects examined in this research. Further evidence on social networks (Windrum and de Berranger, 2002) suggested that trust and external company culture are also considered as important factors that can influence SME owner managers’ decisions to use their social networks as sources of business information, knowledge acquisition and adoption of ICT. In addition, increased network density and interconnectivity within network externalities are widely viewed as vital in influencing small businesses to adopt ICT (Gibbs et al., 2007). Given the importance of key decision-makers in ICT adoption decisions at organisational level, it is therefore crucial for small business managers to recognise possible links and partnerships in their social networks (Gibbs et al., 2007; Manueli et al., 2007; Braun, 2004; Rogers, 1995) as these can bring opportunities and success ventures.

Organisational Readiness

Some previous studies (Bandiera and Rasul, 2002) argued that SMEs which choose not to adopt ICT do so because they may be unfamiliar with the technology and lack organisational readiness (Zappala and Gray, 2006). The organisational readiness can be reflected in the size, type, nature of business as well as ICT expertise and the perceived benefits upheld by management and employees (Gibbs et al., 2007; van Akkeren and Cavaye, 1999; Manueli et al., 2007). According to Thong (1999), the change agents for ICT adoption at organisational level may include the support and attitude (Scupola, 2006; Gibbs et al., 2007) of key decision-makers such as owner managers and chief executive officers (CEO). These key decision-makers have a vital role to play in purchasing, planning and ICT adoption decisions in small business. They are, therefore, expected to have the capacity to respond accordingly to the changing needs of a dynamic e-business environment.

ICT Adoption Theories

Within the ICT adoption approach, several studies (Gibbs et al., 2007; Manueli et al., 2007; Zappala and Gray, 2006; Merhtens et al 2001) mainly derived their theoretical foundation from Davis (1989) Technology Acceptance Model (TAM). The Davis (1989) model suggested that when “a user is presented with a new technology, a number of factors influence their decision regarding how and when they will use it” (Manueli et al., 2007). The key innovation characteristics, notably perceived usefulness (PU) and perceived ease of use (PEOU) are widely used within the adoption approach that builds on TAM. To this end, the following definitions for PU and PEOU are given (Gibbs et al. (2007): (i) Perceived Usefulness (PU): is “the degree to which a person believes that using a particular system would enhance his or her job performance.” (ii) Perceived Ease of Use (PEOU): is “the degree to which a person believes that using a particular system would be free of effort.” Building on the Davis (1989) model, there are various extensions of TAM such as the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) (Manueli et al., 2007; Wahid, 2007; Cloete and Courtney, 2002). The TRA model, which is a more general theory than TAM, includes four general concepts namely: behavioural attitudes; subjective norms; intention to use; and actual use. Similarly, Wahid (2007) presented some key elements of TAM as shown in Figure 1. According to Forman and Goldfarb (2006), TAM has proven to be a robust model that is frequently used to study user acceptance of ICT. It is widely viewed as an information system theory which helps to understand the adoption and use of internet (Gibbs et al., 2007; Davis 1989). The theory helps to understand how adopters come to accept or reject the use of ICT in their small businesses. TAM was designed to explain computer usage through two cognitions: perceived usefulness (PU) and attitude (PEOU) as determinants of intention (Davis et al., 1989). Hart (2010) stated the need for TAM to be integrated with other IT approaches that incorporate decision-makers’ social and idiosyncratic characteristics. It has been suggested in both the academic and trade press that managers need to develop and implement effective interventions in order to maximise employees’ ICT adoption and use (Jasperson et al, 2005). Therefore, identifying interventions that could
influence adoption and use of new ICT can aid managerial decision making on successful implementation strategies (Jasperson et al., 2005).

![Figure 1 - key elements of TAM](image)

However, Manueli et al. (2007) criticised TAM as less comprehensive compared to the diffusion approach which has more innovation characteristics, including time as an essential element of the theory (Rogers, 1995; Gibbs et al., 2007; Manueli et al., 2007; van Akkeren and Cavaye, 1999). TAM was also criticised for not accounting for the influence and personal control factors on behaviour, including the lack of consideration to other factors such as external influences from the environmental attributes, suppliers, customers and competitors (Manueli et al., 2007; van Akkeren and Cavaye, 1999). The DOI approach has its primary focus on how potential adopters perceive an innovation in terms of relative advantage/disadvantage (Rogers, 1995). Furthermore, firms that intensely use a particular technology are often prime candidates for early adoption of the next generation of that technology (Shih et al., 2013). The diffusion of innovations approach in our study is important to understanding the dynamics at play in relation to adoption and use of ICT in SMEs. Within the area of literature discussing diffusion of technology and adoption of ICT, there are discourses focusing on adoption by organisations and also by individuals. These two types of adoption both play a role when investigating the diffusion and adoption of ICT by SMEs. After all, in SMEs many of the decisions are made by the owner-manager. The organisational decision to adopt technology becomes intertwined with the personal perceptions and attitudes of the owner-manager towards that technology (Akkeren and Cavaye, 1999). Diffusion in SMEs is largely by way of interpersonal/inter-firm networks with learning (either willingly or pressurised by supply chain (supply chain slavery) or government demands (through government policy) being critical to the adoption and implementation of ICT.

The GESTOO framework shown above brings together key ICT adoption factors (Mpofu and Watkins-Mathys, 2011; Gibbs et al., 2007: 74), which are supported by existing literature (see Table 1). These factors include government role; environmental attributes; social networks, technological attributes, owner (managerial) attributes and organisational attributes (GESTOO).

<table>
<thead>
<tr>
<th>GESTOO ICT adoption Factors</th>
<th>Examples of Dimensions used for Explaining (Distinctive Characteristics of Small Firms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government role</td>
<td>National policies; vision; strategies and support programmes; taxes and tariffs; regulatory frameworks; subsidies; support infrastructure.</td>
</tr>
<tr>
<td>Environmental attributes</td>
<td>Business environment; suppliers; customers; competitors; peace and stability.</td>
</tr>
<tr>
<td>Social Networks</td>
<td>Network types (formal, informal) associations; network size, effects and density; network externalities and support agencies.</td>
</tr>
<tr>
<td>Technological attributes</td>
<td>Perceived usefulness (PU); perceived ease of use (PEOU)</td>
</tr>
<tr>
<td>Owner/Managerial Attributes</td>
<td>Key decision-makers (management) support and attitude; motivation; perceived benefits; computer literacy; assertiveness; perceived control; mistrust of ICT industry; lack of time; age and cultural background; ICT and business qualifications, skills and experience.</td>
</tr>
</tbody>
</table>
Organisational Attributes

Organisational readiness; business size, sector, type, operations, status; ICT expertise; customer - supplier/dependency; business structural sophistication (simple/complex); information intensity; access to resources (human, financial, technological) support; marketing and strategies.

Sources: Mpofu and Watkins-Mathys (2011)

These key factors are integrated based upon their significant influence on ICT uptake and prevalent usage by several researchers (Gray, 2006; Beckinsale and Ram, 2006; Gibbs et al., 2007; Ritchie et al., 2005; Brown and Licker, 2003; Scupola, 2006). Theoretical foundation of this framework is also largely derived from the Davis (1989) Technology Acceptance Model (TAM). The authors recognise, however, that the framework only provides a snapshot of ICT adoption in small firms without addressing their dynamic circumstances. In addition, the linearity in ICT adoption is still implicit in the framework as a result of recognising and incorporating some attributes from the stage models. Nevertheless, the framework helps to identify the key adoption attributes, including the distinctive and behavioural characteristics of small firms, and provides the means to evaluate their significance in ICT adoption process.

Research Approach/ Design/ Methodology

The study employed both quantitative and qualitative research methodologies to collect data from SMEs in different sectors in South Africa, Botswana and Zimbabwe. Statistical data collected from questionnaire surveys was analysed using robust quantitative data analysis techniques and tools from SPSS. NVivo and epistemological bootstrapping technique (Archer, 1988) were applied for analysing qualitative data generated from follow-up interviews with the participants. The rationale for adopting a qualitative approach for the investigation involving the small hotel businesses in South Africa, Botswana and Zimbabwe was twofold in this paper. In the first instance, as explained by Marschan-Piekkari and Welch (2006), “qualitative research may be preferable in developing countries, where the secondary data required for random samples may be lacking…, and in those cultures in which particular emphasis is placed upon the development of social, face-to-face relations and trust.” Secondly, the use of case studies offered the authors valuable insights into existing theory, management situations and decision-making processes (Marschan-Piekkari and Welch, 2006; Miles and Huberman, 1994; Ghauri and Grønhaug, 2005), which can be explained in depth by qualitative means. To this end, the qualitative results in this paper are based on over 60 semi-structured interviews with participants from case studies in the small hotel industry in South Africa, Botswana and Zimbabwe (Table 2).

As shown in Table 2, a total of 7 case studies were theoretically sampled rather than selected on the basis of their representativeness in South Africa, Botswana and Zimbabwe. These were small hotel businesses which helped in conducting a total of 60 key interviews involving participants that included owner managers, employees and customers. Our intention was to bring out the details from viewpoints of participants by using multiple sources of data such as face-to-face interviews, observation and written documents. Primary data was therefore mainly collected through semi-structured interviews which were complemented by participant observation and document analysis. The use of pseudonyms (SA1; SA2; SA3; B1; B2; Z1 and Z2) shown in the table above to represent case studies in the three neighbouring countries was necessary to address the issues of anonymity and confidentiality. However, the initial results of the qualitative investigation study could not explain the inter-relationships existing between the identified ICT adoption factors, which subsequently were better explained using a quantitative data from a survey of SMEs in the logistics and manufacturing sectors in Johannesburg (South Africa).

Data sources from Survey of SMEs in South Africa

In another investigation for this paper, a total of 130 small firms were surveyed from both logistics and manufacturing sectors in Johannesburg (South Africa) and 52 interviews carried out mostly with owner-managers. The survey data collection procedure in South Africa was carried out in three steps. First, a sample of 500 SMEs was targeted in and around the Johannesburg metropolitan area in the manufacturing and logistics sectors. Mainly the firms were selected from Brabys database and Chartered Institute of Logistics and Transport of South Africa (CILTSA) data base for logistics firms. Two weeks prior to the actual fieldwork, an initial e-mail was sent out to explain the purpose of study and invitation to participate. A total of 134 questionnaires were received, of which 130 were acceptable.
for analysis. The responses were composed of 66 firms (51%) from the logistics sector and the rest 49% (64 firms) were from the manufacturing sector. The sources of data from a survey of SMEs in the Logistics and Manufacturing sectors in Johannesburg, including their characteristics are summarised in Table 3. Data presented in table 3 was collected using survey questionnaires and semi-structured interviews. Empirical evidence of how SMEs adopt and use ICT was gathered on the basis of industry sector, firm size and age and other pertinent characteristics that help provide richer pictures of ICT adoption and use in the logistics and manufacturing sectors in Johannesburg. SPSS quantitative data analysis software was used to identify relationships within the data collected.

Table 2 - Summary of Case Studies (South Africa, Botswana and Zimbabwe)

<table>
<thead>
<tr>
<th>RESEARCH PARTICIPANTS</th>
<th>SOUTH AFRICA</th>
<th>BOTSWANA</th>
<th>ZIMBABWE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA1</td>
<td>SA2</td>
<td>SA3</td>
<td>B1</td>
</tr>
<tr>
<td>Owner/Managers</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Receptionists</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Other Employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.g. restaurant and</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>bar workers, security,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cleaners</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customers (guests)</td>
<td>5</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tour Operators</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total per Establishment</td>
<td>11</td>
<td>4</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Total per Country</td>
<td>17</td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Total Number of Hotel Businesses</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

**Sources:** Interviews, observation and document analyses
### Table 3 - (SMEs in Logistics and Manufacturing sectors in Johannesburg)

<table>
<thead>
<tr>
<th>Details and Descriptions</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interviews</td>
</tr>
<tr>
<td>Industry</td>
<td></td>
</tr>
<tr>
<td>Freight, Warehousing and Distribution</td>
<td>33</td>
</tr>
<tr>
<td>General Logistics</td>
<td>19</td>
</tr>
<tr>
<td>Plastics</td>
<td>17</td>
</tr>
<tr>
<td>Engineering Products</td>
<td>6</td>
</tr>
<tr>
<td>Lubricants</td>
<td>6</td>
</tr>
<tr>
<td>Cabling</td>
<td>7</td>
</tr>
<tr>
<td>Academia</td>
<td>2</td>
</tr>
<tr>
<td>Consultancy</td>
<td>2</td>
</tr>
<tr>
<td>Sector Institution</td>
<td>8</td>
</tr>
<tr>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>Alberton</td>
<td>9</td>
</tr>
<tr>
<td>Johannesburg</td>
<td>15</td>
</tr>
<tr>
<td>Kempton Park</td>
<td>15</td>
</tr>
<tr>
<td>Germiston</td>
<td>5</td>
</tr>
<tr>
<td>Benoni</td>
<td>3</td>
</tr>
<tr>
<td>Sandton</td>
<td>9</td>
</tr>
<tr>
<td>Boksburg</td>
<td>4</td>
</tr>
<tr>
<td>Edenvale</td>
<td>8</td>
</tr>
<tr>
<td>Randburg</td>
<td>16</td>
</tr>
<tr>
<td>Roodepoort</td>
<td>4</td>
</tr>
<tr>
<td>Midrand</td>
<td>5</td>
</tr>
<tr>
<td>Other (Bedfordview, Lenasia etc.)</td>
<td>7</td>
</tr>
<tr>
<td>Number of Employees</td>
<td></td>
</tr>
<tr>
<td>10 or less</td>
<td>15</td>
</tr>
<tr>
<td>11 – 49</td>
<td>39</td>
</tr>
<tr>
<td>50 – 99</td>
<td>20</td>
</tr>
<tr>
<td>100 – 200</td>
<td>22</td>
</tr>
<tr>
<td>Missing variables</td>
<td>4</td>
</tr>
<tr>
<td>Annual firm Revenue</td>
<td></td>
</tr>
<tr>
<td>R5 Million or less</td>
<td>25</td>
</tr>
<tr>
<td>R5 – R10 million</td>
<td>21</td>
</tr>
<tr>
<td>R10 – R20 million</td>
<td>32</td>
</tr>
<tr>
<td>R20 – R40 million</td>
<td>13</td>
</tr>
<tr>
<td>Missing Variables</td>
<td>9</td>
</tr>
<tr>
<td>Age of the firm</td>
<td></td>
</tr>
<tr>
<td>5 years or less</td>
<td>8</td>
</tr>
<tr>
<td>5 0 10 years</td>
<td>17</td>
</tr>
<tr>
<td>10 years and above</td>
<td>75</td>
</tr>
<tr>
<td>Role of Respondent</td>
<td></td>
</tr>
<tr>
<td>30 years or younger</td>
<td>18</td>
</tr>
<tr>
<td>31 – 40 years</td>
<td>14</td>
</tr>
<tr>
<td>41 – 50 years</td>
<td>36</td>
</tr>
<tr>
<td>51 – 60 years</td>
<td>23</td>
</tr>
<tr>
<td>61 years or over</td>
<td>4</td>
</tr>
<tr>
<td>Not Recorded</td>
<td>5</td>
</tr>
<tr>
<td>Gender of Respondent</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>78</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: Survey Data
Discussion of Findings

The aim of this section is to provide an interpretation of the results to enable us to answer the research questions and objectives of this study. The qualitative data from interviews and non-parametric statistical analysis on the survey data suggested that the impact of ICT adoption and use in SMEs cannot be explained on the basis of single variables as it is a result of inter-relationships between several factors. The results of this paper have shown a strong support for the factors identified through the research framework (GESTOO) based on the SPSS results and the epistemological bootstrapping technique. A further discussion of these factors is undertaken next.

Government Role

Government intervention is and has been especially important at sustaining technological development in SMEs through initiatives to foster the adoption and use of ICT (Scupola, 2005) in developed and developing countries. Though support is largely indirect, our findings across the three sectors (tourism, logistics and manufacturing) availed different perspectives in the support given by the government towards the adoption of technology. The case study results suggested that government intervention in their business operations was largely indirect. This was reflected in the role government was playing in setting up policies, providing ICT support infrastructure, power supply, development of tourism infrastructure and dissemination of information to the small businesses. According to a participant from SA2:

“There is a big tourism drive here at the moment. The Benoni local municipality is currently busy upgrading tourism facilities such as publicity association offices, information centres and other infrastructure for tourism in this area. There is always someone to help or give advice at the local information centre or at the Ekurhuleni metropolitan municipality offices which cater for about nine individual municipalities in Gauteng Province. We pick up a lot of useful information from brochures, books and maps which are readily available at these information centres.” (SA2, owner manager2)

From the case study evidence illustrated above, government was playing a significant role in supporting the small businesses in the tourism industry. However, from the interviews and with owner-managers in the parallel sectors, logistics and manufacturing, firms had concerns regarding the role government played especially its ownership of Telkom, the telecommunications operator:

‘Cost of connectivity especially for data transfer is prohibitive as these connections are via the internet. The current bandwidth cannot support our requirements and is too expensive. Bandwidth is priced locally in Rand but is purchased from outside providers in US dollars; as a result exchange rates make it very expensive especially for us small companies’ (Log 044).

Across all sectors, the participants raised concerns in issues like power outages, shortage of public transport, persistence of crime and armed robbery, which they felt were affecting their business activities. The owner managers urged the government to find more effective ways of dealing with these issues. As regard the issue of interrupted power supply, one participant from SA1 suggested that

“The government could do more to ensure that Eskom, [the major power utility in South Africa], has the necessary support to increase the power production capacity. These power cuts that happen without notice are affecting our business activities and the internet services to our guests.” (SA1, receptionist)

Another participant from SA2 added:

‘The problem of load shedding is seriously affecting our business operations and electronic equipment. Now our computer keeps on freezing and occasionally switching off on its own [. . .] we are not certainly sure whether the computer is infected by a virus or it is just faulty because of the power cuts that we have been frequently experiencing since January 2008’ (SA2, Owner-Manager1).
The owner-manager of Man 372 noted the impact on the firm’s manufacturing and product design initiatives resulting from electricity outages:

‘There is a lack of continuous supply of electricity and this hampers the manufacturing efforts of SMEs. Non adoption of ICT to speed up processes and the availability of capital to enable expenditure on manufacturing equipment is an on-going problem’.

The owner-managers’ views are not in isolation. Similarly in Zimbabwe, participants were deeply concerned about long periods of power outages as illustrated in the following quotation:

‘We sometimes go for several days or even weeks without electricity. This is a big problem which is affecting our operations [. . .] It is very frustrating and difficult to do business here without electricity for such a long time’ (Z1, General Manager1).

Clearly, the views from the experiences of the case studies suggested that the participants were expecting their governments in South Africa, Botswana and Zimbabwe to continue addressing these infrastructural issues regarding sustainable power supply in order to support their business operations and ICT adoption efforts. Findings by Beckinsale et al (2006) indicated that in the UK, none of the firms they had interviewed knew of central government schemes to support e-business adoption and none had used UK On-line (a government supported network) facilities. Also, Harindranath et al. (2008) had earlier found only 4% of companies were using governmental agencies as external information sources towards ICT decisions. Researchers have varying views on the role played by the government. Smallbone and Welter (2001) argued that “direct support measures are not the main role for government”, however, bearing in mind the legacy of apartheid in South Africa (i.e. apartheid created two economies in South Africa, one for the white minority with a functional infrastructure and the other one for the black majority which was inadequate to support a functioning society).

Environmental factors

The environmental context includes the external factors affecting a firm’s decision to adopt a technology, either directly or indirectly (competitors, social networking, infrastructure, suppliers and customers). Supply chain encompasses multiple members such as suppliers, customers, producers, service providers and final consumers. In industry generally large organisations hold a prominent position based on bargaining power. Both in developed and developing economies SMEs have and continue to be suppliers to large organisations. Findings showed that more than 50% of studied SMEs were in some form of a trading relationship with large organisations. This trading relationship is validated by a chi-square test result of p≤0.036 which shows there is a significant relationship between firm size and working relationship with large organisations. This was also confirmed by interviewed owner-managers. Similar results were obtained by Tan and Eze (2013) who found that “close relationships with trading partners” is an area of business where being internet-based tended to be important. Biggs and Shah (2006), in examining African manufacturing SMEs and their networks, identified that long term business relationships act as a substitute for weak public institutions. Furthermore, through networking, large organisations raise the performance of ‘insiders’ (SMEs adopting ICT and other capabilities) though this negatively affects market participation of ‘outsiders’. This view holds true for some of the SMEs interviewed who feel the market has reached its maturity and that it has become difficult to create new business relationships with large organisations. Firms are entering into long term contracts making it difficult for new entrants to find new business. This interesting observation highlights the benefits of ICT adoption as an initiative to sustain SME-large organisations partnerships but also alters industry competitiveness by creating barriers to entry for new firms. SMEs are exposed to high competitive pressure from other SMEs and also from large companies. Findings showed that 24% of the firms in the manufacturing and logistics sectors reported of responding to competitors’ ICT decisions as very important for adopting ICT with 64% viewing it as fairly important. This observation illustrates that because of the nature of SME/large organisation relationship, SMEs are inclined to take a lead from their customers making them more competitive in the market. For example, Log 002 saw huge benefits in their operations, finance and accounting and overall ICT use as enabling them to be competitively positioned in the supply chain. Consistent with the insights from other researchers, Mpofu et al (2010) in their research on ICT adoption and development of e-business among SMEs in South Africa suggested that ICT adoption was driven by pressure from competitors and technology suppliers.
Social networks and ICT adoption

With reference to the insights derived from the reviewed theories and distinctive behavioural characteristics of SMEs in this paper, the case study evidence consistently suggested that social networks were significantly important for ICT adoption among the hotel case studies in South Africa. SA1 owner manager, for example, revealed that they were generally getting to know about the website private companies and more information about the Internet Service Providers (ISPs) through social networks such as Johannesburg International Guest House Association (JIGA) and meetings at tourism Expos. JIGA was a large formal social network also serving as a support agency to all registered members. The registered members were benefiting through the regular monthly meetings at which they would share information and experiences with other small hotel business operators, including technology suppliers, private companies providing websites and the Internet Service Providers (ISPs). Like SA1 case study, both SA2 and SA3 were also registered members of JIGA. According to the official documents on the JIGA website [http://www.jiga.co.za](http://www.jiga.co.za):

“All the establishments in this accommodation association are quality checked regularly to ensure the highest standard of guest house, self-catering or bed and breakfast accommodation within a 10 kilometre radius from the Johannesburg International Airport.”

(JIGA, website)

Reflecting on the benefits of meetings of JIGA members, SA2 owner manager revealed that

“JIGA members would pick up a lot of useful information; make contacts; meet suppliers of technology and service providers. As listed members we get better bargaining opportunities for discounts on purchases of technology and other requirements for our businesses.” (SA2, owner manager1)

In other sectors the role played by social networks brings a different perspective. Results show that only 9% of the respondents, mostly in the logistics sector view social contacts as playing the most important role in the adoption of ICT. Nevertheless, nearly half of the respondents (42%) view pressure from the social network as least important, with the same percentage reporting it as fairly important. A Kruskal-Wallis analysis test shows the existence of a significant relationship between pressure from social contacts and the level of education of owner-managers of p≤0.006 with the highest mean average of 79.70 for owner-managers with Grade 10 or below level of education. This appears to indicate that owner-managers with a lower level of education value the opinion of their social network less or their inability to decipher information coming out of their social networks? This observation brings an interesting statistic to the fore regarding education and the general population in South Africa. With blacks accounting for around 79% of the population, any failures to use their social networks regarding technology adoption may explain low rates associated with developing countries such as South Africa. Though findings avail some sectoral differences, research by Beckinsale et al (2011) and Mpofu et al (2011) identified social networks as a critical influence to ICT adoption, the expectation being that specific cultural/social traits may influence ICT adoption to varying degrees and differ for example by ethnicity (Beckinsale et al, 2010) if such a cultural trait is a factor.

ICT consultants/vendors and ICT use in SMEs

Bradshaw et al (2012) noted that SMEs recognise that they do not have the appropriate ICT skills and abilities to select and implement major new systems thus they engage ICT consultants/vendors as a result of a lack of ICT competences. This study’s results show that most SMEs rely on external ICT consultants because of a shortage of internal skills. This is exemplified by the comments of Man 495 owner-manager, ‘We lack qualified ICT personnel and rely on ICT vendors/providers for more technical problems or issues’. In general, ICT consultants can assist firms to bridge knowledge gaps related to ICT adoption and use (Delone, 1988; Nevo et al., 2007), critical for SMEs without adequate ICT expertise. Their popularity rests in large measure on the hope that SMEs can benefit from the cumulative expertise allowing them to improve business processes and profits (Pozzebon and Pinsonneault, 2012). Additionally, findings showed some firms (18%) felt no pressure from ICT vendors to purchase recommended ICT. This represents the firms that have ICT expertise, for example, those that developed their own ICT (Log 044, 072) and those who have highly trained ICT employees with the ability to choose ICT suitable for their firms (Log 031, 044, 072 and Man 304). Despite the pressure
from ICT vendors, in my conversations with owner-managers it appeared they were not being coerced into purchasing these systems rather they were willing participants in the process. However, their continued presence is not without criticism, Lieberman and Asaba (2006) argue that the presence of some technologies in SMEs (e.g. CRM, ERP etc.) as a wilful act by vendors of viewing SMEs as homogeneous, a tenet that goes against core SMEs characteristics. This finding has important implications in the manner ICT consultants/vendors (in their capacity as training providers) approach SMEs; recommending packaged or off the shelf products with no sectoral or firm idiosyncrasy considerations. This is more important in the hotel sector where there are a wider variety of customers and interactions at firm level. SMEs may be coerced to adopt certain ICT that do not interface with for example other foreign networked agencies like IATA or online booking platforms.

SME owner-managers are usually the main decision makers in their firms, hence their perception of ICT is critical in deciding whether or not to adopt. Findings in this study have demonstrated that factors such as compatibility and complexity are critical determinants of ICT adoption while cost was viewed as playing no major role in ICT decision making. Compatibility and complexity of ICT were significantly related to ICT adoption. While these two variables were highly moderated by the availability of external expertise, findings showed a positive correlation of p≤0.002 between ICT compatibility and age of the firm. This finding shows that in addition to the role played by external expertise, the experience of having used ICT gave mature firms (≥10 years old) a willingness and ability to take risks by adopting ICT.

Organisational factors

Often referred to as internal factors of the firm, they are perceived to play an important role in the ICT adoption process. There are a variety of factors that reside in the internal context of the firm such as ICT expertise, resources and owner-manager attributes. Our findings identified, some positive relationships pertaining to key variables such as owner-manager attributes and availability of ICT expertise in the firm.

Owner-manager and the ICT use

Owner-managers play a pivotal role in SMEs in enhancing ICT adoption (Jeyaraj et al, 2006; Mpofu et al, 2010), and also as mediators in the process of ICT adoption (Al Sharji et al, 2013). In this research study owner-manager attributes explored included their ethnicity, level of education, age and experience. Across these attributes, significant relationships were identified:

Age and experience: In the manufacturing and logistics sectors, the results show a similarity across the qualitative and quantitative methods with 36% of the interviewees and 35% of the survey respondents falling in the 41 – 50 years age group. Using non-parametric statistics analysis, results show the existence of a significant relationship between the age of the owner-manager and knowledge of ICT. The chi-square and Kruskal-Wallis analysis results show a significant relationship of p≤0.024 and p≤0.035 respectively in the use of Accounting and Finance applications. During interviews this observation was found to represent the use of advanced ICT as emanating from their initial experiences working in large organisations (Gono et al, 2013). This drove experienced owner-managers to adopt ICT in their firms. However, other researchers offer differing perceptions regarding age of owner-managers. Similar conclusions were also drawn by Mpofu et al (2010) whose evidence from SA3 case study suggested that owner manager attributes such as background, knowledge, skills, attitude and experience played a significant role in ICT adoption. Herrington et al’s (2010) report stated that South Africans aged between 25 and 44 years of age are most entrepreneurially active and that as the age increases the desire to start a business tends to reduce while perceived skills tend to increase with age.

Level of education and ICT use: For decades South Africa was ruled by an oppressive white regime that restricted black people from equally participating in society. As a result, the black majority had very little or no education making it difficult to transition into the new South Africa post-1994 democratic society. Results showed that 49% of owner-managers were of white ethnic background with a tertiary and above qualification (significant relationship of p≤0.041), followed by almost a fifth (19%) blacks and 15% representing Indians/mixed race. With a positive correlation of p≤0.003 on advanced ICT use (database, finance and accounting etc.), this shows that the level of the owner-manager’s education has an impact on ICT use in SMEs. While this study has revealed the importance of education for ICT adoption, Choudrie and Dwivedi (2005) found education attainment having no impact on ICT adoption.
However, these variations are likely to be attributed to the context of the research, methodology used or the type of technology investigated (Chuang et al, 2009). In this study the findings may represent the effects of apartheid where the native majority were restricted access to education.

Ethnicity: Ethnicity of owner-managers is believed to have an impact on ICT adoption by SMEs. Results showed White ethnic background owner-managers accounted 57% for both sectors while Blacks and other ethnic backgrounds accounted for 27% and 16% respectively. Using the Kruskal-Wallis analysis test to determine the impact of ethnicity on the knowledge of ICT applications, the results were interesting in that for the first time, the effects of apartheid on black education was apparent. Of the six applications (Msapp6- $p \leq 0.055$; Databaseapp6 -$p \leq 0.003$; Webapp6 - $p \leq 0.000$; EDIapp6 - $p \leq 0.009$; Sectorapp6 - $p \leq 0.032$ and Accfinapp6 - $p \leq 0.048$), all showed a significant correlation with the black ethnic owner-managers rating themselves very lowly on all applications. This has important implications for training, education and government support initiatives. These findings may also have an impact in the way owner-managers of different ethnic backgrounds network (Beckinsale et al, 2011).

Level of ICT expertise and ICT use: The level of ICT in a firm as reflected by the ICT competencies and capabilities of the employees (Log 044, 072 and Man 277, and SA3) is posited to be critical for the adoption of ICT. Across all three sectors (logistics, manufacturing and tourism) this variable was found to be directly related to the successful adoption of ICT in SMEs studied. In some SMEs this process was necessitated by the assistance of ICT external consultants/vendors. Similar findings were observed in other studies by Caldeira and Ward (2002) and Cragg et al. (2011). Interestingly, empirical data analysis has revealed some sectoral differences in the way firms adopt and use ICT. Similar to the findings by Elbeltagi et al (2013) in his research on the role of the owner-managers in SMEs’ adoption of Information and Communication Technology in the United Arab Emirates, we found that firms in the manufacturing sector were using advanced ICT more intensively shown by the positive correlation between ICT use and technologies used in firms. However, this may be due to product variability associated with the manufacturing industry compared to the service sectors’ offerings or as a result of customers being supplied with advanced products for use in the defence and mining industries.

Conclusions

This study sought to examine ICT adoption in Southern Africa across three sectors: tourism (hotels), logistics and manufacturing sectors. Based on a multiple case study approach, survey and semi-structured interviews held with owner-managers the findings provide rich and in-depth insights which confirm the usefulness of the research framework used in this paper. The adapted ICT adoption model (Gibbs et al, 2007) identifies and integrates key factors that include government; environmental attributes; owner (managerial) attributes; organisational attributes; adoption attributes and social networks. The examples from unique individual experiences of the 3 case studies offered this research with useful insights which help to explain and understand the ICT adoption attributes and development of e-business in SMEs within South African context. In all the three sectors studied, the results suggested that both formal and informal social networks are vital for ICT adoption in small firms. The findings also suggested that various technologies were adopted across the sectors under study, to improve operational efficiency, competitiveness, to enhance positions within the supply chain, for communications, online booking etc. It should be noted that this study was limited to Johannesburg for the logistics and manufacturing sectors and to Southern Africa for the hotel sector, thus any inference and replication of the study in other areas might throw different results.

The findings presented in this paper are based on the individual experiences in the three sectors studied and in the context of Southern Africa. For this reason future research studies across national sectors in South Africa and regional sectors of Southern Africa will bring assist in bringing detailed insights that may shed light on ICT adoption in this context. Building on the previous studies by these authors, more evidence is required to validate the theoretical approaches proposed. Johannesburg is a rich and well-resourced metropolitan comparable to developed countries in terms of economic competitiveness. As a result our findings should be viewed in perspective, thus we are calling for other cross sector studies in this region and other regions to increase the generalizability of the assertions arrived at in this paper.
References


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Biography

Dr. Knowledge is currently a Senior Lecturer (Strategic Management) and Course Leader (HND) at the London School of Business and Management (LSBM). He has over 15 years of international work experience gained from teaching and research in different countries that include Cuba, Zimbabwe, South Africa, Botswana and the UK. In addition, he has language skills in English, Spanish, Shona and Ndebele, all of which he can write and speak fluently. Dr Knowledge is a member of the UK Institute of Export (IoE), which has presented him with opportunities for networking with individuals and companies with industry experience in consultancy, including skills development in import and export business. He is also a key resource person for the Centre for Research & Enterprise at LSBM, and sits on the Editorial Board on this Working Paper Series.

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