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Introduction

Minna Mattila, Editor-in-Chief

This journal, the Interdisciplinary Studies Journal (ISJ), is an international forum exploring the frontiers of innovation, creativity and development. This journal does not limit itself to traditions specifically associated with one discipline or school of thought per se but embraces consideration of emerging issues assessing novel terrains and encouraging change. ISJ serves to both industry and academic communities by advancing the premises for implementing research into practice. These quarterly journal issues are published under a distinguished list of editors, including special issues, comprising an expected annual volume of over 700 pages. ISJ is listed in the Ulrich's Periodicals Directory.

All the ISJ papers are expected to contribute to raising awareness and rethinking the concept of interdisciplinarity. The readership of this journal consists of academics and (post) graduate students together with executives and managers, policy makers and administrators from both public and private sector. ISJ aims to publish papers on diverse subjects related but not limited to service innovation and design, nursing and coping home, security and social responsibility, and student entrepreneurship. ISJ welcomes contributions from both academics and practitioners in the form of original papers and case studies in the subject areas indicated, and on similar topics. The research articles submitted to ISJ are subject to a double-blind peer review. ISJ may also publish book reviews and commentaries on developments in interdisciplinarity as well as notes on research work in progress and reports of relevant conferences.

The articles in this journal stem from Africa to Asia, from Northern America to Europe. We are delighted to present to you a variety of research articles and practical papers representing the chosen subject fields of ISJ. **Watt** and **Chamberlain** examine the outcomes of an educational programme in relation to recruiting, training, and retaining a cadre of safe motherhood advocates. Their article presents the very first programme of its kind with a potential to be replicated in other high-need countries with major challenges to achieving safe motherhood, or to function as a training center for all of East Africa. **Agundu et al.** argue that the strategic holistic innovation (SHI) necessarily sensitizes corporate executives and operatives to not only accept radical systemic change but also function efficiently in the context of the challenge to drive higher business investment performance. **Zolait** and **Mattila** examine in the article the behaviour of potential adopters of Internet Banking (IB) in regards to their preferences, IB services, and uses of related technologies, IB promptness and banking difficulties among potential and actual adopters. **Pesut** finds in his paper relating to interdisciplinary health professions education that the integral theory is useful and provides direction for health professions educators who are invested in creating interdisciplinary models of practice, education and research. The article by **Hyökki** describes how eye tracking data could play an important role in the user research when aiming at understanding the users and the user experience. In the LbD in Practice section of this issue we are proud to bring to you two great examples of implementing the Learning by Developing –model in practice. **Vilkki** and **Halme** go on describing in their individual papers the workplace-oriented pedagogical solutions integrated in the RDI activities as well as the outcomes of project learning.

Training and Retaining Effective Safe Motherhood Advocates

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Abstract

Millennium Development Goal 5 holds the promise of improved birth outcomes for mothers and infants. In sub-Saharan Africa, medical personnel alone are unlikely to be sufficient in number and resources to accomplish this outcome in the foreseeable future. An alternative education programme to prepare non-healthcare providers to be advocates for safe motherhood is described with particular attention to the programme's ability to 'train and retain' these professionals in positions which address the risks to the health of mothers and infants. Using a health promotion model, the programme prepares practitioners to provide community leadership to change precarious circumstances which endanger health (e.g., harmful traditional practises, misperceptions of family planning, lack of transportation and poor water quality) with the goal of creating a physical and social climate which supports and nurtures women and children in their struggle to survive the most dangerous event in their lives – birthing. Almost 100% of graduates have continued to practice in East Africa and to work on safe motherhood promotion activities such as legislation change, public education campaigns, HIV/AIDS prevention, and post-natal care clinics. Community engagement with the education programme has provided a living laboratory for social change experimentation and development as a network of advocates emerges in the region.

Keywords

Safe motherhood, health education, advocacy, brain drain, interdisciplinary

Introduction

Since 2005, Uganda has been the testing ground of a different approach to addressing safe motherhood. Rather than relying solely on health care professionals to duplicate the maternity care of developed countries, Save the Mothers (STM), a Canadian NGO operating in Uganda since 2005, has developed a Masters in Public Health Leadership, housed at Uganda Christian University.

This programme provides training to professionals of various disciplines in public health leadership in addressing the underlying issues which endanger the lives of women and their infants. This paper examines some of the outcomes of this program in relation to recruiting, training, and, particularly, retaining a cadre of safe motherhood advocates.

What is the problem?

Globally, every day, 940 women die due to pregnancy and childbirth complications (Gonzalez-Block 2004). Almost all of these deaths (99 %) occur in developing countries and reflect major inter- and intra-country difference between the rich and the poor. In 1990, the global maternal mortality ratio was 480 maternal deaths per 100,000 live births. Fourteen countries reported maternal mortality ratios of at least 1,000 per 100,000 live births with half of all maternal deaths (265,000) occurring in sub-Saharan Africa (Canada 2003). For every woman who dies, at least 25 others suffer injuries, infection, and disability (World Health Organization 2005). Recognizing this serious public health issue, the United Nations, in September 2000, passed Resolution 55/2, the United Nations Millennium Declaration, which outlined a set of priorities for peace and security, poverty reduction, the environment and human rights (Canada 2005). The eight priorities, collectively known as the Millennium Development Goals (MDGs), included improved maternal health as Goal 5 and established 2015 as the deadline for achieving measurable improvement in the objectives identified for each of the goals.

The United Nations Development Program (UNDP) went on to identify two targets for this goal -- to reduce maternal mortality by three quarters between 1990 and 2015 and to achieve universal access to reproductive health by 2015 (World Health Organization and United Nations International Children's Emergency Fund 1989). Two key indicators for monitoring the progress towards the first target were selected – reduction in the maternal mortality ratio and an increase in the proportion of births attended by skilled health personnel.

More women and their babies died in the 20th century from unsafe childbirth than from HIV/AIDS, tuberculosis, suicides, and accidents combined (Hagopian, Thompson et al. 2004). Despite efforts to curb maternal mortality and raise the standards of maternal care, there has been little progress in sub-Saharan Africa towards the targets and most of the progress has happened in high and middle income countries (Canada 2003; Hogan, Foreman et al. 2010). A woman's risk of dying from treatable or preventable complications of pregnancy and childbirth over the course of her

lifetime remains at 1 in 22 in developing countries, compared to 1 in 7,300 in developed regions (Labonté 2008). This outcome, by any standard, is unacceptable.

Ten out of 87 countries with maternal mortality ratios over 100 maternal deaths per 100,000 live births in 1990 are on track to meet the MDG goal with an annual decline of 5.5% between 1990 and 2008. At the other extreme, 30 countries have made insufficient or no progress since 1990 (Hardin and Hilbe 2001).

It is important to note that inadequate reporting systems make securing exact numbers impossible. However, it is clear that in sub-Saharan Africa, where maternal mortality is highest and, despite an increased access to family planning, decreasing maternal mortality in most countries is falling far short of the 5.5% reduction required to meet the target of MDG 5. The annual decline has been only 1.7%. In individual countries in this region, the situation either remains unchanged or is deteriorating (Hardin and Hilbe 2001).

In Uganda, the government has recognized the need for emergency obstetrical care but, in order to achieve this goal, there is a need to promote coordination among key stakeholders and build partnerships with a variety of sector, including the private sector (Orinda, Kakande et al. 2005). In 2011, the government included safe motherhood as a priority in the national election platform (Tebajjukira 2010). NGO's in Uganda have long recognized the need for the promotion of basic maternal care (Ssengooba, Neema et al. 2003). Despite this recognition, Mbonye et al. reported that 97.2% of the 553 Ugandan health facilities surveyed did not provide basic emergency obstetrical care despite the expectation that they were delivering this service (Mbonye, Asimwe et al. 2007).

Traditionally, efforts to reduce maternal mortality and morbidity have focused on training more health professional to provide increased access to preventative and basic health care in general and to prenatal and attended delivery care in particular. More professionals have been trained and more facilities built without proportionate decreases in maternal mortality. These efforts were not spurious; they were based on the fact that most causes of maternal death are either preventable or

treatable (Williams 2010) and that medical intervention has been demonstrated to reduce maternal mortality. It has been assumed that if the cadre of trained medical personnel was increased, women would automatically seek and access care and, as a result, maternal deaths would decrease. To date, data have not demonstrated that this assumption is true (Khan, Wojdyla et al. 2006). Other factors appear to be holding progress at bay.

Birthing in Uganda is commonly described as “a war” in which women and infants are the casualties. Pregnancy and childbirth are viewed as a test of a woman’s strength and it is hoped that she, with minimal assistance from close female family members, will be triumphant. Death of a woman or of her child is seen as an frequently anticipated outcome to which little attention is paid by the family or the community (Corrieri, Heider et al. 2010). In some areas of Uganda, as in other parts of the world, traditional birth attendants assist women in protracted labours using local customs and practices but many women labour alone. When medical help is sought, it often at a significant distance, complicated by poor transportation, high costs, inadequate care to meet her needs, and a lack of clean water and adequate sanitation.

Past initiatives focusing on increasing the supply of medical personnel to address the health needs of the country has resulted in an increase from 0.7 to 1.3 nurses and midwives/1,000 population and from 0.05 to 0.12 physicians/1,000 population in Uganda by 2000. However, like many other low-income countries, Uganda has suffered from a staggering “brain drain” of these professionals (Commander, Kangasniemi et al. 2004) and has been unable to produce or retain its own comparable medical personnel (United Nations 2000; Kigonya 2004; Luboga, Hagopian et al. 2011).

Arah, Ogbu, and Chukwudi argue that a ‘train, retain, and sustain’ approach to increasing the number of physicians in developing countries is essential if we are to reach acceptable staffing levels (Arah, Ogbu et al. 2008). In the least well-served countries like Uganda, there is a significant risk of losing the most highly trained health practitioners (CIAR 1991; Canada 1997; Work Group on Breastfeeding 1997; Chen, Evans et al. 2004; Hagopian, Ofosu et al. 2005; Croghan,

Beatty et al. 2006; Statistics Canada 2008; United Nations Development Programme (UNDP) 2010; Luboga, Hagopian et al. 2011).

The literature attributes the reasons why individuals leave their country of origin to push and pull factors (Breastfeeding Committee for Canada 2004; Connell, Zurn et al. 2007; Nguyen, Ropers et al. 2008; Willis-Shattuck, Bidwell et al. 2008). Both push and pull factors operate to influence an individual’s decision to leave their country of origin. Push factors (factors that cause dissatisfaction) include low wages, poor working conditions, heavy workloads, criminality, and inadequate management support (UNIFEM 2008). Pull factors (factors that draw people to developed countries) include opportunities for development both professionally and personally, better educational opportunities for children, and recruitment from Western countries (Breastfeeding Committee for Canada 2004).

One of the strongest pull factors is the recruitment of governments in Western countries (Hooper 2008) but this is a factor over which developing countries have little control. Therefore, they must address push factors. Factors associated with why people leave involve a mixture of individual goals and government and private sector policies. Creating solutions for the shortages of professionals in Sub-Saharan Africa will involve addressing both individual needs and health and social infrastructures. Reducing push factors by improving the working and living conditions of health care providers can be a beginning point in retaining providers, thereby strengthening existing systems.

In reference to individual needs, Bärnighausen and Bloom suggest that financial incentive programs have the ability to encourage medical service in under-served areas (Bärnighausen and Bloom 2009). Although appropriate remuneration is important, Mubuke et al. report that financial incentives alone will not improve retention of healthcare providers (Mubuke Aloysius, Kiguli-Malwadde et al. 2010). Rather, healthcare providers need adequate working conditions, proper drugs and equipment, and an appropriate work environment (Nguyen, Ropers et al. 2008). In addition to financial incentives, Stilwell et al. lists such incentives as training, study leave, opportunities to work on a team, support, appreciation, and feedback from supervisors as

important to retention efforts (Stilwell, Diallo et al. 2003; World Health Organization 2008). These findings suggest that improved educational opportunities at home will decrease both the push and pull factors, thereby increasing retention. Indigenous and focused leadership within developing countries is needed if these factors are to be effectively addressed. This leadership needs to be developed and supported as it encourages very practical ways to retain health workers.

The care of women prior to and during pregnancy, delivery, and in the postpartum period provides an excellent example of the challenges to health and social care providers in low-income countries such as Uganda. Addressing the health needs of women and newborns requires not only the technical competence expected of physicians and nurses/midwives but also culturally sensitive and relevant services which address the underlying factors associated with poor outcomes. These services include the promotion of maternal nutrition (thus preventing anemia of pregnancy and death by postpartum hemorrhage), the provision of income generating activities for women (thereby increasing their access to much needed finances during labour and delivery) and the organization of transportation schemes which allow women to reach the health facility in time to obtain lifesaving treatments.

These social determinants of health have been well documented in the literature (Putnam and Galea 2008; Bamba, Gibson et al. 2010; Canadian Medical Association 2010; Whalen and Cramton 2010; Hunter, Neiger et al. 2011) but less well addressed in practice. To reach the goals of safer motherhood requires a new approach -- an increase in local capacity, the creation of local solutions, and an improved overall quality of life for women and children. The approach requires a broadened perspective on who can help achieve safe motherhood and how they might address the underlying issues. In the truest sense, safer motherhood is a health issue and not just a medical problem. It requires physically and politically safe and supportive social environments for women and children.

To achieve this end, it is important to involve men and women, professionals and non-professionals -- to attract the right people who will shape the right model to make the necessary political, social and cultural changes to ensure safe motherhood. The

question now is how to create a critical mass of people with the correct information, skills, and the political will to make these changes and to retain them in-country in the service of the goal of safe motherhood.

We believe that the changes needed in developing countries include new, self-sustaining infrastructures and partnerships involving both medical and non-medical professionals such as lawyers, journalists, politicians, and educators. Poor maternal and newborn health needs to be understood as complex set of problems that arise from an interaction of social, political, and economic factors which provide a backdrop for inadequate human resources. The solutions to these problems require an educational program that attends to these health needs in the broadest sense and not just to the medical problems that are the outcomes. Addressing these issues requires more than just additional medical personnel. It requires a comprehensive approach to public health in its broadest definition. The legal right to care coupled with adequate transportation and financial resources, are required to create the healthy conditions which support uneventful pregnancies and births. The availability of trained medical personnel in at least minimally adequate facilities can then be optimized to care for women who have complications of pregnancy.

The Ugandan Approach

One program has been developed in Uganda which addresses the underlying issues in maternal health and trains and retains practitioners in both the region and the field. The Masters in Public Health Leadership (MPHL) is a post graduate, modular, Master's degree, offered at Mukono, Uganda, through Uganda Christian University. The goal of this program is to train a multidisciplinary team of professionals who will understand the complex issues surrounding safe motherhood and will become leaders competent to initiate substantial positive change. For example, the program recruits and educates journalists, parliamentarians, public health nurses, teachers, and social workers about maternal and newborn health to prepare them to become safe motherhood champions.

The program is structured into modules of three weeks duration. For each of two years, students

take 3 modules of study at the university. Between modules, students are assigned supplementary readings and are expected to create, implement, and evaluate a project or to carry out research in their own community to enhance safe motherhood while continuing their pre-student employment.

The program consists of small and large group experiences with an emphasis on problem-based learning and team-building group activities. Core subjects include the basics of public health and maternity care, organizational leadership, epidemiology and biostatistics, project planning and evaluation, behavioural change, and effective communication. Included in each program are field visits, participation in a mentorship program, written assignments and oral class presentation, all focussing on safe motherhood. A full description of the program may be found at <http://ucu.ac.ug/content/view/151/43/>.

The program is housed at Uganda Christian University which views itself as “A Centre of Excellence in the Heart of Africa”. The University, in its 2004 Strategic Plan, renewed its commitment to partner with communities in East Africa. Its intention is to provide a foundation for the connection of the MPH program to the community and to encourage community activism and advocacy (Uganda Christian University 2010).

Two pedagogical approaches underpin the MPH program – problem-based learning [PBL] (Merewood, Brooks et al. 2006) and experiential education [EE] (Kolb and Kolb 2005). Each module in this program addresses a problem for safe motherhood and consists of at least two field trips including opportunities to interact with communities around issues of maternal health, community attitudes, and community provision of care for mothers. An important part of this kind of learning is the opportunity to reflect on the experience and to develop possible solutions scenarios.

Recruiting the right students for this program means that the program must attract the people in the country/region who can nurture change. They need to have experience in their own professional field and to be connected to their communities. They need to focus cooperatively on one issue at a time within their area of expertise. They need to learn to work together – to use a model which

draws on the experience and resources of the group. They do not need to be health care providers. This approach builds on existing expertise in a range of important areas. To recruit students and to provide meaningful learning experiences in the field, it is critical that any institution providing a leadership training program, work together with the community to improve maternal health.

So far, the program has recruited 156 students. Of these, 54 (34.6%) have completed their degrees and 102 (65.4%) remain in-course. Of those in-course, 44 (43.1% of students currently enrolled) are in the process of completing and defending their research project. Ninety-three percent (145) of these students are from Uganda. The other 11% (7) come from other East African countries.

To combat “brain drain”, this program makes staying in-country a priority. Students continue to be employed in their current positions while in the program. East Africa cannot afford to lose core, scarce, and highly educated people to increased mobility through education. Curbing the “brain drain” can be accomplished by keeping students employed, raising their status, and hence increasing their incomes. Additionally, this approach provides indigenous staff for foreign NGOs. The end result is increasing in-country capacity. The question becomes, is this approach working to keep graduates in the field and in Uganda?

Finally, MPH graduates will be in a position to continue education and advocacy about safe motherhood. This can be accomplished through their contributions to and impact on mass media, advocacy and the school system.

The two approaches, public health and clinical medicine are not mutually exclusive. Public health specialists will compliment medical interventions that are targeting the improvement of maternal health.

Leading the way, finding a path

To determine whether or not the program is achieving its goals, a two-pronged approach was used. The research projects of students conducted in the field were examined for relevance to safe

motherhood and graduates were surveyed about their post-graduate employment situation.

Each of the 54 graduate research project was classified according to its primary focus. Four categories were used: prenatal/delivery and postnatal services sexual and reproductive health;

social determinants of maternal health; and, service utilization. Many projects had secondary foci in reflecting multiple categories.

Table 1 Thesis Area of Research

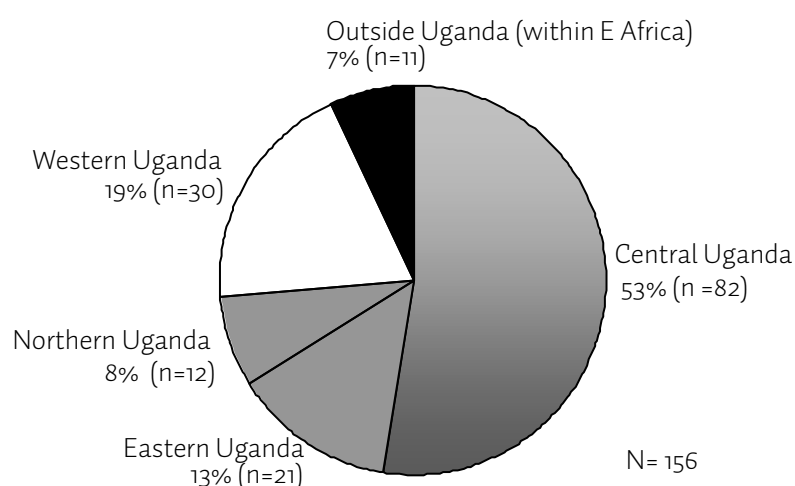
	Prenatal, delivery and postnatal care	Sexual & Reproductive Health	Social Determinants of Maternal Health	Service Utilization	Totals
2007	3	1	2	2	8
2008	3	3	3	1	10
2009	9	7	4	7	27
2010	3	6	0	0	9
Totals	18 (43.3%)	17 (31.5%)	9 (16.7%)	10 (18.5%)	54 (100%)

The research covered a broad range of topics, all with direct application to pressing issues of safe motherhood in East Africa. Each project was executed in the field and supervised by a member of the graduate faculty. Students were required to undertake a public defence of their work in accordance with the degree regulations of Uganda

Christian University. Projects reflected the diverse spectrum of issues and services that influence maternal health prenatal care and conditions, quality of delivery services, cultural factors influencing service use and evaluation, and sexual and reproductive health issues.

Table 2 Research Project Topic

Area of Research	Sample project
Prenatal and delivery care	<ul style="list-style-type: none"> Factors Affecting Utilization of Post Natal Care Services among Mothers in Nyakinama Sub-county, Kisoro District Dietary Intake and Nutrition Status of Pregnant Women Attending Antenatal Care Services at Mulago Hospital: Kampala Quality of Maternal Health Care Services; Perception and Utilization by Mothers in Mpigi District
Antenatal and postnatal care	<ul style="list-style-type: none"> Quality of Antenatal Care Services Offered at General Military Hospital Bombo Factors Affecting Women Willingness to Attend Antenatal Care Services in Rwampara County, Mbarara District Client Satisfaction with Antenatal Care Services at Kalisizo Hospital Rakai District Uganda
Sexual and reproductive health	<ul style="list-style-type: none"> Reproductive Health for Married Adolescent Girls: Their Knowledge, Perceptions and Practices (A Case Study of Lutolo Parish, Bugiri District, Uganda) Factors Influencing the Use of Moonbeads as a Tool for Natural Family Planning in Kawempe Division, Kampala Factors Responsible for High Teenage Pregnancy in Arua District. Case Study of Vurra Sub – County
Social determinants of health	<ul style="list-style-type: none"> Factors Influencing Male Involvement in Maternal Health: A Study of Bwikara and Kagadi Sub-counties in Kibaale District Domestic Violence Among HIV Patients Attending Nsambya Hospital HIV Chronic Care Clinic Male Involvement in Safe Motherhood Initiatives: A Case of Nama Sub - County. Mukono District
Service utilization	<ul style="list-style-type: none"> Factors Responsible for the Low Utilization of Delivery Services in Health Centres of Katikamu Sub-county, Luwero District Assessing Client Satisfaction with Maternal Health Care Services in Private Health Insurance Companies - A Case Study of Three Private Health Insurance Companies in Kampala District The Feasibility of Integrating PMTCT Services into the TASO HIV & AIDS Care Package

**Chart 1** Distribution of Save the Mothers Students and Graduands by Geographic Location

Graduates continue to work for government, NGO, and Civil Society organizations. In September

2010, the employment picture of graduates is as follows:

Table 3 Employment Sector of Graduates

Employment Agency of Graduate:	# of Graduates	% of total
NGO	24	44.4
Public	11	20.4
Private	11	20.4
Public-Private Partnership	2	3.7
International	1	1.8
Unknown	5	9.3
Total	54	100.0

The results of this program have been to create a networked core group of East African public health leader with expertise in safe motherhood. Students have demonstrated significant specialized learning about factors which promote or endanger safe motherhood in developing countries and in East Africa in particular. Fifty percent of graduates claim an increase in job status since beginning the program and 100% claim to continue to work in their own field on issues of safe motherhood. Graduates of the program are being recruited by all sectors for advice, expertise, and leadership to enhance Uganda's capacity to provide better maternal and infant care.

The future

Limitations

The program is not without limitations. One major limitation is the fact that faculty, most of whom are Ugandan, are part-time and travel long distances to the campus to fulfill teaching responsibilities. Their time commitment is limited and the economic necessity of juggling many jobs produces divided loyalties and limited time and energy commitments to this programme.

Similarly, there are huge and multiple time pressures on students outside of class which create

tensions within the program. There is pressure on space and learning resources within the University which are now being addressed through increasing use of online resources (e.g., links to the McMaster University Library and center for educational development). The development of electronic journals has enabled the most up-to-date information to be readily accessible to students but the absence of reliable high speed internet deprives students and faculty alike of consistent access.

There are challenges in evaluating the specific impact of this training program on safe motherhood in Uganda, separate from initiatives of other sectors. An evaluation program is currently being undertaken by STM in an attempt to identify, isolate, and measure outcomes such as employment uptake, program development and enhancement, and in-country retention of providers in relation to its own students.

Additionally, changes in maternal and newborn outcomes which can be directly linked to safe motherhood interventions are being documented. As previously noted, the accuracy and completeness of public data on maternal and newborn outcomes is suspect. Even more problematic is the attribution of changes in this data to specific safe motherhood initiatives. As in most development initiatives, we suspect that positive change will come from the combined

efforts of many approaches to improving the quality of life in Uganda.

Finally, there are limitations in the funding available for student tuition and field projects. This means that students who have found excellent mechanisms for improving maternal and child health both during the program and after when they return to local community agencies often are unable to implement their programs. These indigenous leaders may come into direct competition with international NGOs for resources. The program is exploring more cooperative avenues to secure appropriate funding to implement and evaluate student driven, "home-grown" solutions. Possibilities

Save the Mothers graduates and students have been involved in increasing media coverage of safe motherhood issues, training students in primary and secondary schools as well as introducing national legislation which holds the government accountable for safe motherhood. This type of legislation has served as a basis for current legal action against the federal government for mothers who have died from preventable pregnancy complications in Uganda (Dugger).

Along with the limitations, there are a huge number of possibilities. This program is the first of its kind with the potential to be replicated in other developing countries which have major challenges in achieving safe motherhood. It is also possible to think about the Ugandan program becoming a training center for all of East Africa in collaboration with other East African universities and international institutions. For example, UCU, Makerere University, Mbarara University of Science and Technology in Uganda and McMaster University in Canada have recently become partners with the United Nations University Institute for Water, Environment and Health to launch local research into the water and health issues in the region (Canada 2005). This new focus has the potential to significantly improve the health of women and children through bolstering the water and sanitation infrastructure.

Conclusion

Educators interested in retaining personnel who promote safe motherhood in developing countries need to look beyond the training of medical care personnel who provide a valuable but incomplete service. If the underlying economic, political, and social factors which endanger the health of women and children are to be addressed, a new approach must be taken, involving practitioners of many disciplines. They must be educated to become committed to and skilled in making the necessary changes in both policy and practice. They must become advocates for safe motherhood.

The Masters in Public Health Leadership described in this paper provides an educational prototype for programs to attract community leaders and to provide them with the knowledge and skills necessary to make and sustain those necessary changes. Developing their ability to make significant changes within Uganda mitigates the push factors, thereby supporting graduates to remain in-country and in the field of safe motherhood. It keeps professionals in their jobs while enhancing their knowledge, skills, and, hence, their status. It mitigates pull factors by providing in-country education rather than training abroad. As a net result, the contribution of alumni infiltrates many layers of social and political infrastructures. Consequently, the program works to sustain personnel with a commitment to this international health and well-being goal.

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Strategic Holistic Innovation: Quintessential Boost to Food and Beverage Business Investments in Nigeria

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Abstract

There is growing need for business organizations in Nigeria's well-endowed economy to accentuate new ideas and processes, which would impact significantly on general attitudes and projected financial altitudes. Against this backdrop, strategic holistic innovation (SHI) necessarily sensitizes corporate executives and operatives to not only accept radical systemic change but also function efficiently in the context of the challenge to drive higher business investment performance. In the Nigerian environment, this study has abundantly established that through the instrumentality of SHI. With it, the firms in the food and beverage sector would also brace up and be counted among the innovation-friendly, innovation-compliant and investment-efficient. They should, therefore, demonstrate greater poise to perform or perish. This is the corporate advocacy of all time and SHI is the key.

Keywords

Strategic change, Strategic innovation, Strategic sectors, Nigerian investors

Introduction

In strategic terms and for meaningful operational purposes, it is expedient to differentiate innovation from change. Innovation involves new ideas that are novel not only to an organization but also to the industry. By extension, strategic holistic innovation (SHI) is an integral part of strategic change.

Drawing the line between change and innovation, Robbins (1990) contends that all innovations, represent change, but not all change is innovative. Essentially, innovative change breaks new ground. For most people who still think innovation is limited to technological break-through, Damanpour (1987) argues that innovation typically may be technological or administrative. Technological

innovation encompasses the use of new tools, techniques, devices or systems to produce change in products or services rendered; while administrative innovation is the implementation of change in organization structure or its administrative process.

Whatever the form, innovation is highly associated with business/economic success. At the macro-economic level, it plays the role of a chief provider and prevails as major cause of the difference in the level of wealth between wealthy and poor nations (Drucker 1985). It is the very foundation of entrepreneurship, as a practice and as a discipline. Hence, analysts contend that innovations and technological change account for half the increase in America's productivity. At the level of the firm, innovation remains a significant key to gaining strategic advantage. The sustainability of advantage is related to the dynamics of competition and nature of the underlying innovation. Approaches to and methodologies for strategy formulation therefore take cognizance of the fact that competition is increasingly dynamic and that innovation and competitive advantage creation are intrinsically interrelated. The traditional instruments to formulate strategy generally start from a picture of competitive environment and are not able to reap the dynamic aspects of it.

In another perspective, many equally confuse innovation with invention. Drawing a distinction, Nylen (1990) notes that invention is a creative event, while innovation is a creative process. Inventions are associated with new logic schemas and morphologies that provide novel solutions to existing problems, relying on craftsmanship which is becoming rarer in firms (Arghiri 1982). It is very logical that inventions become profitable only when they are innovatively applied in business investments. Innovation also applies to other needs in the industry that had hitherto been met by other conventional solutions. Nylen (1990), thus, described innovation simply as the process of bringing new ideas or new applications into general use. It is better show-cased as a creation, a new device or method, or a new idea or a new way of using existing knowledge.

Essentially, the difference between innovation and invention is clearer with the understanding that:

- Invention is a creative event, while innovation is a creative process;
- Innovation is more widespread in organizations than invention and is not limited to the coming into being of a new technology (it stretches to work methods, processes and structures); and
- Innovation is often underestimated in organizations (prevailing as process of persuading people to adopt an invention).

In the light of all these, the pertinent analytical questions are:

- Why are some business organizations more innovative than others?
- Are there conditions that favour organizational change and innovation above others? And
- How many business organizations create the enabling environment for successful SHI?

This study sought to diagnose and come to contemporary terms with particular focus on the Nigerian food and beverage industry.

Conditions for Strategic Holistic Innovation

The path to successful strategic holistic innovation (SHI) and organizational renewal is in the not-too-comfortable terrain of breaking down traditional bureaucratic structures for which most business organizations are known. Firms are required to transform to e-organization which represents a seven-dimensional model of the centerless enterprise. The other six dimensions, besides flat organizational structure, are leadership, people and culture, coherence, knowledge, alliance and governance. Each of these dimensions when strategically applied in an appropriate dose encourages out-of-the-box thinking and behaviours that promote the organization and remove the strategic business units (SBUs) from a lock-step system of policy and measurement. The actors then

properly apply their imagination, knowledge and common sense in pursuit of new opportunities, advancing the enterprise towards centerless corporation. The concept of centerless corporation was actually promoted by Pastemack and Viscio as an alternative model to the traditional bureaucratic organization which hampers corporate performance.

The centerless corporation essentially seeks to flatten the organization and bring employees closer to decision centers by eliminating middle level management. Pertinently, strategic change programmes need an enabling environment and this is found in simple, flat and adhocratic organizations, which essentially encourage innovation and improve performance. With respect to organizational renewal, Daft (1998) notes that one auspicious mode is reengineering. It represents a radical redesign of business process that can lead to big results-and usually big layoffs. As organization structures become flatter and middle management is eliminated, employee teams become more empowered to make decisions. The concept of teamwork is a fundamental change in the way work is organized, as companies increasingly recognize that the best way to meet the challenges of higher quality, faster service, and total customer satisfaction, is through well aligned and coordinated effort by motivated workers.

Business organizations which are free of traditional bureaucratic structures are better placed to achieve innovation and improved organizational performance. Achieving productivity through people simply means that everyone must participate. Rank-and-file workers are considered the root of quality and productivity. People are generally empowered to participate in productivity, marketing, and new product improvement. Conflicting ideas are encouraged rather than suppressed. The ability to move ahead through consensus usually preserves the sense of trust, increases innovation and facilitates innovation and efficiency (Daft, 1998). Thus, SHI most likely flourishes in adhocracies and simple structures. Adhocracy remains the form of organization design configuration, characterized by high horizontal differentiation, low vertical differentiation, low formalization, decentralization, and great flexibility and responsiveness. In an adhocracy, novel solutions are needed which make standardization and formalization inappropriate (Robbins, 1990).

Systematically, innovation is stimulated in adhocracies by personnel (who are sound professionals), lack of formalization, and active involvement of lower-level employees in decision making. Nonetheless, the key to innovation in the simple structure lies not in the structure itself but in the chief executive officer (CEO). The personality, power and knowledge of the CEO differentiate those simple structures that innovate from those that do not or fail. Paradoxically, it takes more than the enabling structures for innovation to flourish. It directs attention to the human element anchored typified on knowledge and creativity, and ideally not limited to the CEO. Much as the CEO's disposition and flair for creativity are critical, organization's innovative power lies heavily on the role of specially-talented organizational members for whom innovation constitutes a niche. Organizations in the leading economies are visibly placing emphasis on the role and place of these individuals by creating knowledge or innovation departments headed by talented and specially trained professionals, playing strategic roles as knowledge officer, intrapreneur, change champion, etc.

Lynch (1997) observes that change brings uncertainty and some organizations and individuals are better able to cope with it than others. Thus, analysis of strategic pressures for organizational change has to be made alongside the type of organization and identified phases of organizational growth as inter-related issues. The business organizations are then analyzed for their ability to cope with change on the basis of strategic archetypes, as proposed by Miles and Snow (1978). For instance, a defender organization produces products or services with the objective of obtaining market leadership, and as such is able to cope with sudden strategic change. It is equally very comfortable with steady strategic change. The prospector organization operates in growing markets, actively seeking new opportunities through innovation. It is typically flexible and decentralized in approach to the market with higher ability to respond quickly to change. The analyzer organization, not only seeks to expand but also protects what is already accomplished. It may wait for others to innovate and delay while others prove new market opportunities before entering. The reactor organization, according to Lynch (1997), responds inappropriately to competitors and the general environment. It rarely, if ever, takes

initiative and may have no strategy. It always reacts to other firms' strategies, but where it has a strategy, it is usually entirely inappropriate to the environment, hence the resulting reaction is bound to be inadequate.

The phase of growth is a significant determinant of how tolerant a business organization is to change. Whatever organizational classification may be used in the analytical process, some changes will be more rapid than others. Greiner (1998) identifies two major determinants as the age and size of the organization. Young organizations are typically full of crisis, creative, perhaps a little chaotic, but actively seeking change. As they grow older and achieve success, there is more to defend and coordinate. The small organizations are rather closer to the market place and have simpler administration, but they become larger and acquire more people, they set up complex systems and procedures to cope. The financial analytical angle this study sought to address has to do with the question: how do we look in the eyes of shareholders? The goals in this regard include profitability, growth and shareholder value while performance measures include cash flow, sales growth, return on sales (ROS), return on assets (ROA), return on capital employed (ROCE), etc. These generally indicate whether a firm's strategy formulation and implementation contributes significantly to bottom-line improvement and more strategically whether it is meaningfully innovating. These pro-innovation dynamics are very instructive and particularly imperative for up-looking firms in the Nigerian food and beverage industry.

Nigeria's Food and Beverage Industry in Perspective

Nigeria's food and beverage industry is increasingly attracting more local and foreign investors in recent times. Accordingly, food is fast becoming Nigeria's top business. The growing vibrancy of this industry is largely sustained by the productive agricultural sector which provides the industry with cheap and reliable raw materials driven by the huge available local market. In addition, the near absence of serious external competitive pressure from close regional neighbours has helped this industry to thrive and boom. At the heart of the boom in this industry is the fast food business which is spreading and growing astronomically. Many streets of

Nigeria's mega cities, especially, Lagos, Port Harcourt and Abuja, are littered with fast food and allied recreation/entertainment centers. The industry has become so active and attractive that multinationals, including UAC (owners of Mr. Bigg's) have taken the center stage with numerous local outfits competing aggressively.

Nigeria's food and beverage industry is indeed worthy of serious policy and strategic research attention given its growth rate. Food processing business is estimated to grow at 6-12 percent, on an estimated GDP growth rate of 5-10 percent in five years. The snack food business alone is estimated at 40,000 tons in volume terms and worth N10 billion, with an average growth rate of over 6. Firms in Nigeria's food and beverage industry have in recent years operated under a stringent legal regime tied to the strings of National Agency for Food and Drug Administration and Control (NAFDAC) as well as Standards Organization of Nigeria (SON). These two agencies serve as industry watch-dogs and their policies pose critical operational checks and balances to corporate players in this industry. The new legal environment created by NAFDAC has significantly impacted organizations in the food and beverage industry in two ways: On one hand, the firms are challenged to creatively adapt to the new reality through innovation programme so as to cope with the value creation standards required by the new legal regime. This situation expectedly places pressure on their resource base as well as core competencies in the industry, in the circumstance. Those who are unable to cope would naturally go under. On the other hand, the strict legal requirements for registration have indirectly secured, for local firms, some relief from foreign competitive pressure.

The changes witnessed by the food and beverage industry in Nigeria have also created a new and dynamic legal environment which while encouraging the sprouting of many local outlets had at the same time, driven many out of business. Generally, therefore, the industry is a fairly large one, profiled by dealers in snacks, bottle water, soft drinks, and various forms of liquid beverages; including popular home-staples, as flour, canned food, fast food, dairy products etc. As the legal environment becomes increasingly unfavourable for the importation of fruit juice and other forms of beverage drinks, more indigenous firms are

springing up everywhere, while the foreign ones are opening production or assembly factories.

This resulting scenario indeed makes research in this industry particularly challenging. On one hand, it is particularly tasking to deal with the target population as some of them are practically inaccessible. On the other hand, the duly registered organizations, being apprehensive of the watchful eyes of NAFDAC, have a predilection for secrecy. The feasible option left for meaningful research was the resort to quoted organizations as study units. The frontline companies listed on the Nigerian Stock Exchange (NSE) under the food and beverage industry at the time of the doctoral research, thus included Nestle, Cadbury, Nigerian Bottling Company, 7-Up Bottling Company, Flour Mills, Northern Nigeria Flour Mills, P.S. Mandrides, Foremost Dairies, and Union Dicon Salt.

Strategic Holistic Innovation - Corporate Performance Linkages

The dominant dimensions are highlighted below:

a) **Product Innovation-Corporate Performance Connect:**

Evidence from some marketing-based empirical studies points to an association between product innovation and performance (Calantone, Carvusgil and Zhao, 2002; Cooper, 1994; Desphade and Webster, 1993). These studies, however, did not employ objective financial measures in their evaluation of corporate performance. It is possible that the results of these studies would have been different if conventional objective financial measures like profitability ratios were used as the indices for assessing the level of performance recorded by the organizations studied. Product innovation should naturally yield late financial results because of the time lag between when it is introduced and when it is accepted by the market. A new product demands new technology, new skills, new work practices and, of course, new employee behaviours. These behavioural changes take place slowly and hence lead to delayed financial results (Lawler, Mohrman and Ledford,

1998). Thus, the innovative growth paradigm which seeks to leverage product innovation generates long-term returns to shareholders.

b) **Technological Innovation-Corporate Performance Connect:**

Technological innovation (like product innovation) is a technical form of innovation and usually brings with it radical changes in organizational practices. This, in turn, provokes quantum changes in employee behaviour and the resultant constraints. Naturally, organizational members tend to resist such radical and quantum organizational changes that technical forms of innovation often introduce. Technological innovation is often accomplished through such organizational change programmes as business process re-engineering (BPR) and total quality management (TQM). Radical innovative change programmes are in most cases unsuccessful. BPR which was initially popular is now denounced by many as defective. Like re-engineering, many initiatives associated with similar change programmes have achieved only short-term cost reduction but not real change (Hall, 1987). Results of studies relating to the association between this form of innovation and corporate financial performance are sometimes inconsistent. Lawler, Mohrman and Ledford (1998), for instance, used a broad index of TQM practices and examined the link between them and financial performance. The study found insignificant the relationship between TQM and such financial performance measures as ROS, ROA and ROCE using 1996 data from organizations studied. They could not establish any relationship at all using 1993 data from the same organizations.

c) **Administrative Innovation-Corporate Performance connect:**

Administrative innovation revolves around such issues as organizational goals, structures and practices. This global imperative for innovation has compelled many organizations to effect radical alterations in their structures. Some are

shifting to horizontal organizations with self-directed teams. This global challenge precipitated such innovative structures as networking and virtual organizations. Some organizations equally adopt joint ventures and consortia as their administrative innovation strategies. The aim of these structural innovations is basically to enable organizations focus on their core competencies (but do these elements of administrative innovation have any relationship with an organization's corporate financial performance?). Evidence from empirical studies points to the fact that administrative innovation is, indeed, a determinant of corporate financial performance. ROA, for instance, has been found to be linked to improvement on administrative practices (Huselid, 1995). Huselid and Becker (1996) also found an association between management practices and market value of corporations.

d) Human Resource Innovation-Corporate Performance Connect:

Human resource innovation has to do with innovative alterations in organizational culture and is often described as cultural innovation. Several empirical studies have established an association between organizational culture and organization performance. Denison (1990) found that organizations with auspicious culture of participation had higher ROS and return on investment (ROI). Participative culture has also been found to be significantly associated with ROA. Collins and Porras (1994) also found significant association between culture attributes and financial performance. The study compared eighteen visionary companies and their competitors (using these attributes as measures of employee culture) and concluded that visionary competitors created more shareholders value. Lawler, Mohrman and Ledford (1998) equally found strong correlation between improvements on employee involvement (EI) and such profitability ratios as ROS, ROA and ROCE. The indicators of employee involvement which they adopted were similar to conventional measures of

organizational culture. The relationship between corporate culture and corporate performance was equally investigated and confirmed by several other researchers like Hansen and Wernerfelt (1989) and Kotter and Heskett (1992). Ironically, cultural innovation does not seem to be receiving the deserved attention in the corporate policy of most organizations. This is probably why many innovation programmes fail. As a matter of fact, innovation generally provokes complex human resource-related issues which only a properly articulated cultural innovation programme can effectively address.

These innovation dimensions were examined in this study with respect to firms in the Nigerian food and beverage industry. Fundamentally, the hypothetical research propositions (HRPs) of this study are:

HRPO1: ROS is not significantly influenced by human resource and administrative innovation.

HRPO2: ROS is not significantly influenced by product and technological innovation.

HRPO3: ROA does not significantly relate to human resource and administrative innovation.

HRPO4: ROA does not significantly relate to product and technological innovation.

HRPO5: ROCE is not significantly associated with human resource and administrative innovation.

HRPO6: ROCE is not significantly associated with product and technological innovation.

Methods

The study focuses on food and beverage firms quoted on the Nigerian Stock Exchange (NSE). The firms listed in the NSE Fact Book (2005) include Nestle Plc, Cadbury Plc, Nigerian Bottling Company Plc, 7-up bottling company Plc, Nigeria Flour Mills Plc, P.S. Mandrides Plc, Foremost Diaries and Union-Dicon Salt Plc. For expediency and precision, they are designated in this study as Firm I, Firm II, Firm III, Firm IV, Firm V, Firm VI, Firm VII and Firm VIII, respectively. The strategic nature of the study

required the administering of questionnaire on one top corporate executive of each of the eight quoted firms. This was done with a view to accessing primary data on the four strategic innovation enumerations (technology, product, administration and human resource) and the corporate will to continuously innovate. The NSE Fact Book (2005) provided the needed secondary data for analysis and determination of the critical performance/profitability measures (ROS, ROA and ROCE). The correlation and regression of hypothetical variables entail analysis and computation of Pearson Correlation Coefficient (PCC), coefficient of regression (r), coefficient of determination (R²), and t-statistic; facilitated by These are contained in the Tables 1 - 9:

MS Excel and Windows 11 programmes of the Statistical Package for Social Sciences (SPSS).

Results

In a cross-match analytical process, the results are harnessed from two sets of data:

Product, technological, administrative and human resource innovations in years 2000-2001 versus ROS, ROA and ROCE in 2002; and

Product, technological, administrative and human resource innovations in years 2002-2003 versus ROS, ROA and ROCE in 2004.

Table 1 ROS Analytical Details

Corporate Financial Performance								
S/N	FIRM	ROS 2000	ROS 2001	ROS 2002	ROS 2003	ROS 2004	ROS Ave.	Rank
1.	I	0.1707	0.1786	0.1621	0.1514	0.1348	0.15952	1 st
2.	II	0.1049	0.1245	0.1404	0.1305	0.1270	0.12546	2 nd
3	III	0.0358	0.0856	0.0113	0.1003	0.0638	0.5936	3 rd
4.	IV	0.0556	0.0491	0.0973	0.0972	0.0766	0.07516	4 th
5.	V	0.0254	0.0126	0.0355	0.0060	0.0256	0.02102	5 th
6.	VI	0.0302	0.0242	0.0355	0.0352	0.0366	0.03234	6 th
7.	VII	0.1030	0.1054	0.1549	0.0868	0.0558	0.10119	3 rd
8.	VIII	0.0861	0.0626	-0.01421	-0.6090	-0.8050	-0.25590	8 th
	Average	0.07646	0.08033	0.07785	-0.00020	-0.03560	0.03977	
	Standard Deviation	0.04653	0.05159	0.06502	0.23429	0.29309	0.11985	
	Variance	0.00201	0.00245	0.00377	0.05429	0.08716	0.01341	

Source: NSE Fact Book, 2005 (With SPSS Output)

Table 2 ROA Analytical Details

Corporate Financial Performance								
S/N	FIRM	ROA 2000	ROA 2001	ROA 2002	ROA 2003	ROA 2004	ROA Ave.	Rank
1.	I	0.3668	0.3735	0.3595	0.3194	0.2862	0.34108	1 st
2.	II	0.3487	0.2684	0.3051	0.3038	0.2667	0.29854	3 rd
3	III	0.0600	0.2137	0.2437	0.1962	0.1244	0.16760	5 th
4.	IV	0.3052	0.2670	0.4028	0.3161	0.2268	0.30358	2 nd
5.	V	0.1253	0.0653	0.2086	0.0228	0.0996	0.10432	6 th
6.	VI	0.0838	0.0735	0.1368	0.1192	0.0865	0.9996	7 th
7.	VII	0.2012	0.4165	0.2013	0.1877	0.0906	0.21946	4 th
8.	VIII	0.1073	0.0780	-0.1127	-0.3693	-0.4179	-0.14292	8 th
	Average	0.19979	0.21949	0.21814	0.13699	0.09536	0.17395	
	Standard Deviation	0.11634	0.12861	0.14948	0.21475	0.20840	0.14710	
	Variance	0.01273	0.01553	0.02033	0.04160	0.03988	0.01931	

Source: NSE Fact Book, 2005 (With SPSS Output)

Table 3 ROCE Analytical Details

Corporate Financial Performance								
S/N	FIRM	ROCE 2000	ROCE 2001	ROCE 2002	ROCE 2003	ROCE 2004	ROCE Ave.	Rank
1.	I	1.3290	1.6985	2.1266	2.3811	2.2119	1.9494	1 st
2.	II	0.4058	0.4981	0.3276	0.3257	0.2970	0.3708	3 rd
3	III	0.0652	0.2449	0.2796	0.2479	0.1769	0.2029	5 th
4.	IV	0.3062	0.3172	0.5334	0.4275	0.2884	0.3743	2 nd
5.	V	0.1391	0.0983	0.3012	0.0503	0.2300	0.1638	7 th
6.	VI	0.1471	0.1343	0.2962	0.2429	0.1909	0.2023	6 th
7.	VII	0.2012	0.4219	0.2962	0.1861	0.0888	0.2203	4 th
8.	VIII	0.1491	0.1349	-0.2428	-3.704	-4.4373	-1.6200	8 th
	Average	0.34271	0.44351	0.47815	0.01969	-0.11918	0.23298	
	Standard Deviation	0.38607	0.49293	0.65595	1.57451	1.75956	0.89621	
	Variance	0.13268	0.21623	0.38563	2.44537	3.10501	0.75794	

Source: NSE Fact Book, 2005 (With SPSS Output)

To confirm the reliability of the data relating to the financial performance measures, reliability tests are carried out using Cronbach Alpha. All the three financial performance measures show high degree of reliability, well above the minimum benchmark of 0.70 (stipulated by Nunally, 1978).

Table 4 Reliability of Financial Performance Data

Performance Measure	Cronbach Alpha
ROS	0.8223
ROA	0.9219
ROCE	0.8518

Source: Research Data (SPSS Output)

Table 5 Reliability of Constructs

SHI		
S/N	Sub-sets	Cronbach Alpha
1.	Product innovation	0.8119
2.	Technological innovation	0.9195
3.	Administrative innovation	0.8504
4.	Human resource innovation	0.9323

Source: Research Data (SPSS Output).

Table 6 Correlation Results-Strategic Innovation (2000-2001) and Financial Performance (2002)

Sub-sets	ROS		ROA		ROCE	
Product innovation	Pcc:	0.667	Pcc:	0.916**	Pcc:	0.442
	Sig:	0.071	Sig:	0.001	Sig:	0.273
Technological innovation	Pcc:	0.754*	Pcc:	0.857**	Pcc:	0.687
	Sig:	0.031	Sig:	0.007	Sig:	0.060
Administrative innovation	Pcc:	0.844**	Pcc:	0.738*	Pcc:	0.727*
	Sig:	0.008	Sig:	0.037	Sig:	0.041
Human resource innovation	Pcc:	0.877**	Pcc:	0.849**	Pcc:	0.795*
	Sig:	0.004	Sig:	0.008	Sig:	0.018

Source: Research Data (SPSS Output)

Key: Pcc: Pearson Correlation Coefficient

** Correlation is significant at 0.01 (2-tailed)

Sig: Level at which correlation is significant

*Correlation is significant at 0.05 (2-tailed)

Table 7 Correlation Results-Strategic Innovation (2002-2003) and Financial Performance (2004)

Sub-sets	ROS		ROA		ROCE	
Product innovation	Pcc:	0.109	Pcc:	0.002	Pcc:	0.096
	Sig:	0.797	Sig:	0.996	Sig:	0.820
Technological innovation	Pcc:	0.602	Pcc:	0.588	Pcc:	0.601
	Sig:	0.114	Sig:	0.125	Sig:	0.115
Administrative innovation	Pcc:	0.699	Pcc:	0.794*	Pcc:	0.754*
	Sig:	0.054	Sig:	0.019	Sig:	0.031
Human resource innovation	Pcc:	0.849**	Pcc:	0.903**	Pcc:	0.872**
	Sig:	0.008	Sig:	0.002	Sig:	0.005

Source: Research Data (SPSS Output)

Key: Pcc: Pearson Correlation Coefficient

** Correlation is significant at 0.01 (2-tailed)

Sig: Level at which correlation is significant

*Correlation is significant at 0.05 (2-tailed)

Table 8 Regression Results-Strategic Innovation (2000-2001) and Financial Performance (2002)

Sub-sets	ROS		ROA		ROCE	
Product innovation	R:	0.667	R:	0.916	R:	0.442
	R ² :	0.444	R ² :	0.839	R ² :	0.195
	t:	2.190	t:	5.592	t:	1.207
	Sig:	0.071	Sig:	0.001	Sig:	0.273
Technological innovation	R:	0.754	R:	0.857	R:	0.687
	R ² :	0.568	R ² :	0.734	R ² :	0.472
	t:	2.808	t:	4.066	t:	2.316
	Sig:	0.031	Sig:	0.007	Sig:	0.060
Administrative innovation	R:	0.844	R:	0.738	R:	0.727
	R ² :	0.713	R ² :	0.545	R ² :	0.529
	t:	3.860	t:	2.680	t:	2.596
	Sig:	0.008	Sig:	0.037	Sig:	0.041
Human resource innovation	R:	0.877	R:	0.849	R:	0.795
	R ² :	0.770	R ² :	0.720	R ² :	0.632
	t:	4.481	t:	3.928	t:	3.207
	Sig:	0.004	Sig:	0.008	Sig:	0.018

Source: Research Data (SPSS Output)

Table 9 Regression Results-Strategic Innovation (2002-2003) and Financial Performance (2004)

Sub-sets	ROS		ROA		ROCE	
Product innovation	R:	0.109	R:	0.002	R:	0.096
	R ² :	0.012	R ² :	0.000	R ² :	0.009
	t:	0.269	t:	0.006	t:	0.237
	sig:	0.797	Sig:	0.996	Sig:	0.820
Technological innovation	R:	0.602	R:	0.588	R:	0.601
	R ² :	0.363	R ² :	0.346	R ² :	0.009
	t:	1.848	t:	1.781	t:	0.237
	Sig:	0.114	Sig:	0.125	Sig:	0.820
Administrative innovation	R:	0.699	R:	0.794	R:	0.754
	R ² :	0.489	R ² :	0.630	R ² :	0.568
	t:	2.396	t:	3.198	t:	2.807
	Sig:	0.054	Sig:	0.019	Sig:	0.031
Human resource innovation	R:	0.849	R:	0.903	R:	0.872
	R ² :	0.720	R ² :	0.815	R ² :	0.760
	t:	3.932	t:	5.139	t:	4.360
	Sig:	0.008	Sig:	0.002	Sig:	0.005

Source: Research Data (SPSS Output)

Revelations emerging from the above statistical highlights clearly indicate that:

- ROS is significantly influenced by human resource and administrative innovation.
- ROS is slightly influenced by product and technological innovation.
- ROA relates significantly to human resource and administrative innovation.
- ROA relates moderately to product innovation.
- ROCE is significantly associated with human resource innovation; and
- ROCE is slightly associated with administrative, product and technological innovation.

Discussion

Profitability is central to the evaluation of corporate financial performance. Traditional measures of corporation financial performance like those in this

study (ROS, ROA and ROCE) are essential profitability ratios. However, using reported profits as the basis for comparative evaluation of corporate financial performance, fundamentally may not be full-proof, as higher reported profit figures than those of a smaller competitor may actually be less profitable than the latter. This is because net profit is in itself a function of the volume of activities which in turn depends on the size of the organization as reflected in such variables as asset base and capital employed. Besides, performance is logically a measure of an organization's efficiency in the utilization of human, material and financial resources.

Conventionally, the respondent organizations were comparatively evaluated in terms of their corporate financial performance. Since the firms differ remarkably in size, their net profit figures are not used as basis for judging their financial performances. Instead, they are used to compute the ROS, ROA and ROCE which constitute the criterion variables. While the NSE Fact Book had eight firms listed, it is noteworthy that some organizations in this industry (not listed) had crashed out of operations in the 1990s. Interestingly most of these organizations had a particular trajectory of financial performance in the period leading to the cessation of operations. Their performance records are characterized by fluctuations in net profits and profitability ratios,

especially ROCE. In addition to these fluctuations the trajectory of decline in financial performance ratios that culminated in corporate collapse tends to credibly reenact the results of Altman (1971) who investigated corporate bankruptcy in America.

Outside the NSE, some organizations that are still active in the industry also display the trajectory of financial performance that characterized the firms that collapsed. The rest in that bracket are not performing impressively either, especially when gauged in terms of profitability ratios. For the quoted bracket, Firm I appeared to stand clearly as the leader in the industry. The 2003 Annual Report of the firm shows that its leadership is due largely to SHI activities. In that year, for instance, the company invested hugely in the technological development of production processes and distribution operations. The company also initiated product modification and re-launching of existing products with new innovations. The improvements made on Milo, Nescafe and Magi remarkably raised the market performance of the products. The specific innovations included addition of energy-releasing Vitamin B to improve Milo. Also, the television cooking programme and other forms of innovative adverts aimed at improving the image of magi cube are equally well outlined in the Firm's Annual Report (2003). With respect to the comparative analysis of the four predictor variables, human resource innovation manifested clearly as the strongest determinant of corporate financial performance.

The relationship between human resource innovation and the (respective) three different measures of corporate financial performance were tested and the results of each show very strong positive relationship with the dependent variable. In other words, human resource innovation exerts significant influence on ROS, ROA, as well as ROCE. These findings are quite in line with the outcomes of five studies on the effects of organizational culture on performance (Demison, 1990; Hansen and Wernerfelt, 1989; Colins and Porras, 1994; Lawler, Mohrman and Ledford, 1998; Kotter and Heskett, 1992). Ironically, business organizations in Nigeria's food and beverage industry give the least attention to organizational culture in SHI efforts. Human resource innovation received less than average attention in this industry between 2002 and 2003 while it received about average attention between 2000 and 2001. The neglect of

human resource innovation by organizations in this industry thus contributed to their unimpressive financial performance within the period under review. SHI indeed provokes people issues which tend to limit the success of innovation efforts, if not well handled (Jones, George and Hill, 2004).

The effect of administrative innovation on corporate financial performance is more evident with ROA as dependent variable. Results of the analyses point to a significant relationship between ROA and administrative innovation. The link between administrative innovation and ROA is supported by Huselid (1995) who found a significant relationship between improvement in administrative practices and ROA. The measures of administrative Innovation, in this study however, compare partially with those of the above study, because in addition to administrative practices, goals and organizational structure were included in the administrative innovation constructs of the present study. Besides, there was another study of Huselid and Becker (1996) which showed a relationship between management practices and market value of corporations. Market value, of course, relates to profitability ratios. Administrative innovation has proven to be indeed a predictor of corporate financial performance.

Like human resource innovation, administrative innovation, ironically, received very little attention in the food and beverage industry within the period under review. In reality, administrative innovation ranks next to human resource innovation in the degree of influence on corporate financial performance. By deemphasizing administrative innovation, business organizations in Nigeria's food and beverage industry are apparently not in tune with the global trend on SHI. For many years now, several organizations adopt structural innovations such as networking, so as to focus on their core competencies while outside specialists handle other activities. Others get involved in joint ventures, consortia, or virtual organizations to extend operations and markets internationally. Product innovation relates more strongly with ROA as shown in the analysis. However, the result generally did not provide clear and conclusive evidence that product innovation is a strong and direct predictor of corporate financial performance. From the findings, the relationship is apparently uncertain and unpredictable. Nonetheless, many empirical studies point to an association between

product innovation and corporate performance (Calantone, Carvugil and Zhao, 2002; Cooper, 1994; Desphande and Webster, 1993). The above studies (which were conducted mainly from the background of marketing unlike ours which was in the context of financial policy) did not use objective quantitative financial performance measures.

Equally worthy of note is the fact that product innovation generally engenders change in technology which in turn necessitates change in organizational practices. As Lawler, Mohrman and Ledford (1998) observes, it takes time for these practices to change behaviours and for behavioural change to cause change in financial results. This explanation supports the results that product innovation (2000-2001) show weak relationship with ROS (2002) but strong relationship with ROS (2004). The fore-going argument is also consistent with the findings of Lucier and Asin (1996), that companies in the innovative growth paradigm generate long-term returns to shareholders by focally sustaining their growth engine. The growth engine, according to the study, could be a stream of product innovation leveraged by the Innovative growth paradigm to drive growth in profitability and revenue, as enunciated in their new growth theory.

Like product innovation, technological innovation engenders change in organizational practices which in turn cause change in behaviour. There is therefore, a lag between these changes, the results of which appear belated (if at all) on the organization's balance sheet. The fundamental reason technological innovations do not sometime translate to improved financial performance is that they are usually resisted owing to radical and quantum organizational changes they introduce. Hall (1987) also notes that many initiatives associated with several change programmes achieve some short-term cost reduction while real change had proven elusive. This argument could account for the inconsistency in the relationship between technological innovation and corporate financial performance. Another twist in the study outcomes regarding the association of technological innovation and corporate financial performance is the technological inertia that characterizes the food and beverage industry in Nigeria. This is without prejudice to those studies which established that an environment with rapidly changing technologies is necessary for

technological innovation to yield competitive advantage (Jaworski and Kholi, 1993; Greenley, 1995).

Conclusion

Business organizations in Nigeria's food and beverage industry are practically confronted with the paradox of success. As they march into a new and bewildering investment era in Nigeria's evolving democracy, they encounter unprecedented opportunities to capture rich and new territories. Yet their archaic models encourage the pursuit of technological innovation, with little emphasis on administrative change. This clearly hampers their performance and subdues efforts to win the territories. In the circumstances, a model that proposes a departure from this counter-productive paradigm is needed, and this is what this study has provided. It offers a model that leverages human resource innovation as direct performance enhancer and vitally necessary platform for overall SHI.

For an embattled sector like Nigeria's food and beverage industry, this study could not be more significant. Managers in this industry will find it particularly useful, especially for the normative guide it proffers them to appreciate the intricacies of SHI in the Nigerian context and apply same in their day-to-day policy decisions. Fundamentally, it calls for an upward review and prioritization of the pattern of emphasis placed on the administrative innovation domain. Culture is such a strong social factor in Nigeria that the average Nigerian worker appears to carry along to the work place.

Organizations that neglect the strategic imperative to place higher emphasis on the administrative/cultural domain of their SHI programmes are bound to pay dearly for the oversight. Human resource (cultural) innovation equally improves corporate performance not only by enhancing worker-skills and productivity but also creating a new cultural ambience that effectively sensitizes and equips employees to adopt other forms of innovations (Ahiauzu, 1999; Agundu, 2002; Amah, 2004; Kiabel, 2007). Business organizations in the food and beverage industry could obtain optimal results from their SHI programmes by appropriately reordering and carefully harmonizing the various elements of these programmes. In practical terms, technological and product innovations could be preceded in a harmonious order by appropriate

forms/phases of administrative and cultural innovation.

Another key lesson managers in Nigeria's food and beverage industry should learn is that fluctuations in profitability ratios in this industry are not mere evidence of financial vicissitudes which could be straightened and smoothened through conventional performance improvement strategy. The performance trajectory offers an early warning signal (EWS) for managers in this industry which should not be trivialized but immediately confronted with an appropriate turnaround strategy to avoid corporate collapse. For the world of research, scholars in strategic investment and general business management may walk through this study into a gallery of challenges. With SHI, being context-sensitive, the findings made herein may have to be validated in other Nigerian industries, on one hand, and other economies on the other hand. Also important is the need to redirect innovation-based studies to the often neglected area of cultural innovation which has proved to be vital to corporate performance. This study indeed has provided a challenge and base for evolving a more specific alarm system for Nigeria's food and beverage industry and the entire macro-economy at large. While there is still a dearth of empirically developed theories on why firms keep failing frequently, particularly in developing economies, research efforts in the field of corporate health have merely produced statistical models for predicting failure (Altman, 1968; Argenti, 1976; Altman, 1977; Fubara, 2000). Worse still, forging out a model for the realistic prediction of corporate collapse (in the Nigerian economy) is still a far more disturbing challenge. This study opens a window of research activities that would culminate in the development of more predictive models that are contextual to Nigerian business investments/enterprises. Having established the relationship between SHI and corporate financial performance and prescribed the normative guide for corporate excellence, the following recommendations are considered very crucial:

- i. Human resource innovation should strictly be accorded greater prominence in corporate policy framework;

- ii. Corporate organizations should conscientiously develop a culture that supports the new way of doing business that SHI engenders;
- iii. Business organizations should richly invest in human resources and establish a clear link between human resource innovation strategy and their corporate vision while developing a culture anchored on a people partnership;
- iv. Management should meaningfully encourage entrepreneurship by engaging free thinkers and evolving a structure that gives workers the latitude to creatively express themselves;
- v. Business organizations should regularly conduct environmental assessments and promptly factor the results of these assessments into their SHI framework;
- vi. Business investment managers should organically adopt more flexible and decentralized structures (as against mechanistic bureaucratic and hierarchical structures) in order to enable employees respond immediately to opportunities;
- vii. Management should adequately ensure that the organization has the right quantum and quality of men, money, materials and machines (4Ms) as they are very critical to the actualization of the level of change envisaged in a given innovation programme; and
- viii. Management should professionally co-ordinate SHI efforts in such a manner that the aggressiveness with which the organization responds to external environment matches the level of environmental turbulence.

All these, taken together, significantly provide grounds for management to regularly conduct performance evaluation (after all, what you

measure is what you get). Financial and non-financial parameters are vitally important to the drive for greater organizational effectiveness, but until SHI is there, the meaningful profitability, viability and sustainability targets of investors in the Nigerian food and business industry would remain a mirage.

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Behaviour of Internet Banking Adopters: An Examination of the Psychological and User's Readiness Determinants

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Abstract

Research attempted to examine the behaviour of potential adopters of Internet Banking (IB) in regards to their preferences, IB services, and uses of related technologies, IB promptness and banking difficulties among potential and actual adopters. Research self-administered 1000 questionnaires to obtain convenience sample of 369 responses from IB and non IB users at 17 banks operate in Yemen. Study employed the multivariate analysis of variance (MANOVA) to explore the sample population characteristics and the role of exposure, awareness, experience, and knowledge in behaviour formation of the IB potential adopters. Findings show that there are some of IB promptness and difficulties towards using IB services. Also, customers hold high experience, exposure, and awareness are those most likely to react towards the adoption than the others with low averages.

Keywords

Internet Banking, Consumer behaviour, Financial Services

Introduction

The financial services sector is the only major market, in which a substantial proportion of all customers have begun purchasing a larger number of products over the Internet (Mattila et al., 2002). Academics have shown great interest in modelling the innovation adoption process in terms of electronic banking: the self-service technology studies have focused on certain aspects of the adoption process relating to Automated Teller

Machine (ATM) (Rugimbara et al., 1994), telephone banking (Al-Ashban et al., 2001), Internet banking (Sathye, 1999; Black et al., 2001; Suganthi, et al., 2001; Mattila et al., 2005) and mobile banking (Mattila et al., 2002; Mattila, 2003; Suoranta and Mattila, 2004; Laforet and Li, 2005; Luarn and Lin, 2005 and Pedersen, 2005).

Internet banking refers to the delivery of banking services over the Internet. Customers use Internet banking services for example for accessing

accounts, transfer of funds, buying financial products on-line, ordering cheque books, printing statements and checking transactions and paying bills (Chang, 2004). Relatively, little empirical research has been carried out to examine the behaviour of Internet banking adopters concerning both psychological variables (e.g., attitude, subjective norm and perceived behavioural control) and users' readiness variables (e.g., exposure, awareness, knowledge and experience). Hence, there is a need to examine the behaviour of four categories of adopters in the light of aforementioned psychological and readiness variables. Also, there is a need to identify the relevant factors, which affect the bank customers' intentions to use Internet banking. This study of worth value for both services providers and academic because it contribute to expanding the knowledge about users' Informational based readiness attributes as well as the human behaviour with respect to this type of technology usage. Furthermore, it gives the chance for the bankers to understand further how to exploit users' psychological and readiness variables to develop IB services that comply with the IB adopters' expectations.

Background

Internet banking is a new channel for delivering services to customers, and is growing rapidly in overall the world (Calisir and Gumussoy, 2008). However, it is generally believed that IB practices are not progressing at the same level in some context such as Yemen. The plausible reasons highlighted by Zolait et al., 2008, is due to the low Internet penetration rate, the slow growth of Internet Banking services providers and security concerns amongst consumers seems to be main reason (Zolait et al., 2007). The entire banks in Yemen have their own website and the presence of domestic banks considered as informational, which takes the shape of communicative services (Zolait et al., 2008). It is obviously that banks provide the customer information on historical background, organizational structure, a list of services and products, contact channels and publish the annual financial reports electronically in their websites. Foreign banks are much better in providing the customers links to other community information, advertisements, and search engines. IB has made real headway in Yemen; however, its adoption rate,

user acceptance, and utilization by Yemeni Internet users are still unknown because there is no much research has been done yet. In general, the IMF (2003) reported that electronic banking is still in its early stages of development in Yemen. Few banks exceed the information reach to higher levels of interactivity that have an interactive website. Three local banks and one foreign bank are leading the IB services in Yemen (Zolait and Ainin, 2008). Most national and foreign banks in Yemen, whether they offer online banking services or not, have established websites that provide information on their products and services. Bank websites range from the basic to the complex. Those offering e-banking services have highly developed websites offering demos, information, interactive features and tools to facilitate customer banking. The IB services provided by banks in Yemen are discussed based on Perumal & Shanmugam's (2004) and Southard & Siau's (2004) methods in identifying types of IB service (Appendix No. 1).

Generally speaking, IB is the most recent delivery channel for banks, which serve in the retail banking services (Calisir and Gumussoy, 2008). Banks in developing countries such as Yemen have started thinking of a greater presence on the Web and they believe that using information systems, telecommunication and technologies, customers can reach out to the bank and get not only general information about its services but also the opportunity to perform interactive retail banking transactions. Online banking refers to several types of services through which bank customers can request information and carry out most retail banking services such as balance reporting, inter-account transfers, bill-payment, among others, via a telecommunications network without leaving their homes or organizations.

Literature Review

Eriksson et al. (2005) pointed out that frequency of technology use as well as the duration of the experience with the technology has been found to capture the consumer's use of a technology. Previous research examining the use of e-rail conducted by Ba-Alawi's (2004) found that 81 % are not familiar with the Internet and 19 % are familiar with the computer. The propensities by existing customers to switch to electronic channels are unequal (Weill, 2001). There has been some underestimation as well as overestimations in

terms of customer movement online. For example using stock market related products online has proved to have a very rapid development whereas the mobile banking uptake hasn't been as efficient as estimated some years ago. The most likely early adopters are the banks' best customers, i.e. the educated, wealthy individuals, who have access to the Internet, who are not afraid of the new technologies, and who are prone to try the new offering (see for example Mattila 2002; Mattila et al. 2002, Al-Sabbagh & Molla, 2004; Chang, 2004; and Eriksson et al., 2005).

Channel service level is one of the critical factors affecting the customers' movement from old to new financial delivery channels (Mattila 2002). Personal selling has been found to lead in the best results when moving customers between channels but the power of advertisements shouldn't be overlooked either (Mattila 2002). Banks need to be also aware of different adopter categories opinions' towards improving efficiency. What is perceived to be efficient, personal service by others may not be the same for different customer segments. Also the pricing preferences are likely to differ according to different user groups. Therefore, it is of an utmost importance that the different adopter categories are to be approached appropriately through service delivery channels of their choice. According to Mattila (2002), late adopters find bank's name important, valued social contacts with the banking personnel, and short distance to a branch, majority and early adopters valued above all speed and freedom from time and place. While late adopters seem to value social contacts, early adopters tend to appreciate freedom from time and place and speed. Although it was suggested by Mattila (2002) that early Internet banking adopters are not as price sensitive as late adopters are, the mean score in her study for price was not significantly different between the different adopter categories. Mattila (2002) also argued that the loyalty is not defined by the adopter category as such (e.g. late adopters are more loyal to a certain bank branch than early adopters) but is more related to the experienced switching barriers. Mattila (2002) has listed some of the crucial question a bank is likely to face after deciding to move its services online. The actual adoption rate over time is difficult to estimate. There are several risks also involved such as the threat of losing best customers to first-strike competitors in the new channels. But the biggest question of them all may be managing the adoption

process in overall. It may be advantageous for the bank either to speed up or slow down the adoption process.

Rogers (1983, p.262) has suggested using two basic statistical parameters to divide a normal adopter distribution into categories which are mean and standard deviation. Therefore, Rogers's categorization are dividing adopters into five categories, namely, innovators, early adopters, early majority, late majority, and laggards, with 2.5%, 13.5%, 34%, 34%, and 16% of the population respectively. Apart from Rogers's classification, researchers in this study are using terms rejecters, late adopters, early adopters and so forth for customers who have an intention to start using the service. By doing so in this study, researchers not aiming to conflict with other authors such as Rogers (1995) and Mattila (2002) who referred those terms to people who are actually using the service. Since this study aims at first to forecasting the behaviour of potential adopters of IB, definition of these newly proposed adopters' categories were highlighted previously and reserved for this study.

Methodology

Quantitative approach method employed in which the study used existing and validated questionnaire items adapted from previous literature review. The 7-point Likert scale used to assess intention, attitude, subjective norm, behavioural control, knowledge, experience, exposure, and awareness. The convenience sampling method was used in sample selection to ensure that only users who were more related and have the experimentation with banking activities were included. In this research, a structured survey questionnaire was employed to obtain information about all the variables of interest. The overall and achievable response rate was roughly (37 %) of the 1000 questionnaires self-administered to respondents living in one of the biggest cities in Yemen (Sana'a) and have bank account at any of the 17 banks operating in the country. This area was selected because respondents closely represent the characteristics of typical bank account holders, computer and internet users in Yemen. Respondents were internet bank users, internet but not internet bank users, and neither internet nor internet bank users. Pilot test and several

diagnostic tests were conducted and appropriate corrective measures taken. The study utilized the multivariate analysis of variance (MANOVA) combined with simple techniques of measuring sample tendency (e.g. analysis of average, frequency, percentage, standard deviation of data value for variables in relevant to respondents' profile, usage of technologies, IB services ranking, respondent's willingness toward IB and banking difficulties).

Analysis

Researcher will perform simple descriptive analysis at first, to look into sample tendency related to the users' behaviour with some related technologies. Then multivariate analysis of variance (MANOVA) will be conducted for further understanding different IB adopter in the light of both psychological and readiness determinates.

Behaviour in Using Technologies

Table (1) shows the distribution of the sample in terms of four technologies expected to be related to the adoption of IB. It also, shows that the entire sample (N=369) uses the services of the banks represented by a percentage of 100 % which helps to achieve the purpose of the study. It also shows that accumulated percentages of 79 % have been using the Internet while the rest (21 %) have not used it yet. More than one third (36.3 %) of banks' client respondents had experienced using the Internet for an average duration of from one to four years. The distribution of the sample population shows that only 8.1 % have still not experienced the computer while the rest of the sample (91.9 %) have used this kind of technology. Findings also show that 38.8 % of the sample has been using computers for more than eight years.

Table 1 Behaviour in Using Technologies

Statement	Responses	Freq.	%
Q1 Do you use banking services?	Yes	369	100
	No	0	0
Q1.1 How long have you been using computers?	Never	30	8,1
	1-4 Years	69	18,7
	5-8 Years	127	34,4
	9 Years >	143	38,8
Q1.2 How long have you been using Personal banking services?	Never	7	1,9
	1-4 Years	105	28,5
	5-8 Years	107	29,0
	9 Years >	150	40,7
Q1.3 How long have you been using ATM services?	Never	141	38,2
	1-4 Years	192	52,0
	5-8 Years	24	6,5
	9 Years >	12	3,3

Previous research examining the use of e-rail conducted by Ba-Alawi's (2004) found that 81 % are not familiar with the Internet and 19 % are familiar with the computer. Therefore, this low percentage of individual's familiarity with both computer and the Internet contributes to lower the rate of e-rail usage in Yemen. In terms of using personal banking services, Table (2) shows that 1.9 % had never used personal banking services while

the rest had used them and 40.7 % of them had been using bank services for 9 years and above. With respect to the usage of computers, 8 % of the whole sample indicated that they had not used the computer yet. Meanwhile, 73 % of them have been using computers for a period 5 or more years. The distribution of the sample population shows that more than half of the respondents (52 %) have been using ATM technology for a period of between 1 to

4 years while 38.2 indicated that they had not used it yet. Statistical findings on ATM use show that ATM technology is the least common technology experienced in terms of time by the sample of respondents. In order to further understand the behaviour of IB adopters use frequencies were considered here to understand to what extent the

introduced technologies had been experienced by the sample. This was also used to understand the behaviour of both users and the potential adopters of IB towards IB technologies. Specifically, the use of seven technologies was examined and responses shown in Table (2) as follow;

Table 2 Technology Usage

Questions	Responses						Total
	Never	1<a month	1 = a month	1> a month	1> a week	1> a day	
Computer	28 (7.6%)	13 (3.5%)	5 (1.4%)	26 (7.0%)	52 (14.1%)	245 (66.4%)	369 (100%)
Banking Services	13 (3.5%)	43 (11.7%)	43 (11.7%)	106 (28.7%)	99 (26.8%)	65 (17.6%)	369 (100%)
Internet	82 (22.2%)	34 (9.2%)	17 (4.6%)	48 (13.0%)	79 (21.4%)	109 (29.5%)	369 (100%)
ATM	143 (38.8%)	22 (6.0%)	32 (8.7%)	107 (29.0%)	58 (15.7%)	7 (1.9%)	369 (100%)
SMS Banking	299 (81.0%)	16 (4.3%)	12 (3.3%)	15 (4.1%)	10 (2.7%)	17 (4.6%)	369 (100%)
IB	318 (86.2%)	14 (3.8%)	11 (3.0%)	15 (4.1%)	6 (1.6%)	5 (1.4%)	369 (100%)
e-rail	325 (88.1%)	15 (4.1%)	12 (3.3%)	8 (2.2%)	6 (1.6%)	3 (.8%)	369 (100%)

The percentage and the figure above are its relevant frequency

Table (2) indicates that the majority of the sample respondents had never used e-rail (88.1 %), had never used IB (86.2 %), and had never used SMS banking (81.0 %). Respondents who claim never to have used ATM services were represented by 38.8 %, and the Internet (22.2%). Technologies more frequently used were the computer (66.4% daily). This was followed by the Internet and the Banking services technology (30 % and 18 %). Table (3) shows three technologies used the least based on the respondents' responses to the survey in which the majority of the respondents reported never having used them represented by proportions ranging from 81.0% to 88.1 % for the three

technologies of e-rail, IB, and SMS banking.

Analysing and Ranking IB Services

Some services that could be offered through IB were evaluated in order to understand to what extent these services are of importance to customers provided through IB. Table (3) presents specified data on the mean scores and standard deviation obtained from the sample of about 15 IB services. Then the descriptive comparison was carried out and rankings applied.

Table 3 IB Services Ranking by Respondents

IB Services*	Rank	Mean	S.D
Outstanding balance	1	6,19	1,54
Print account statement	2	5,92	1,75
Exchange rate	3	5,91	1,64
Utilities payment	4	5,68	1,90
Stop payment on cheque	5	5,49	2,10
Transactions inquiry	6	5,44	1,95
Fund transfer between accounts	7	5,36	2,10
Credit card and ATM card	8	5,17	2,12
Web-shopping	9	5,17	2,10
Set-up new bank account	10	5,10	2,17
Cheque book order	11	5,03	2,11
E-Phone banking	12	4,71	2,17
Provide LC and other relevant services	13	4,63	2,21
Change password and user id	14	4,52	2,25
Bank interest rate	15	4,31	2,46

* IB Services evaluated using items of 7-point Likert Scale (see Appendix II)

Comparing the mean shows that services such as inquiring about outstanding balances, printing account statements, inquiring about exchange rates, utilities payments, enabling a customer to stop the payment on an undesired cheque, were all the top five online services in the ranking. Services such as online inquiry about bank interest rates were demonstrated as not being an important service with mean score ($\mu = 4.31$) while inquiring

about outstanding balance service was the most widely used service and considered to be important by respondents scoring a mean ($\mu = 6.19$). Furthermore, both potential adopters and users of IB were assessed in terms of their preferences for IB services. The following Table (4) explains the differences between the two groups of bank customers.

Table 4 Ranking Two Groups of IB Services Customers

IB Services*	Potential Adopters of IB			Active Users of IB		
	Rank	Mean	S.D	Mean	S.D	Rank
Outstanding balance	1	6,18	1,56	6,26	1,41	1
Print account statement	2	5,88	1,82	6,16	1,22	2
Exchange rate	3	5,90	1,67	5,98	1,48	3
Utilities payment	4	5,64	1,94	5,90	1,56	5
Stop payment on cheque	5	5,56	2,13	5,64	1,84	9
Transactions inquiry	6	5,39	2,01	5,74	1,52	7
Fund transfer between accounts	7	5,31	2,12	5,70	1,66	8
Credit card and ATM card	8	5,05	2,18	5,90	1,52	4
Web-shopping	9	5,13	2,17	5,41	1,35	10
Set-up new bank account	10	5,02	2,25	5,31	1,50	12
Cheque book order	11	4,92	2,18	5,76	1,44	6
E-Phone banking	12	4,61	2,23	5,36	1,66	11
Provide LC and other relevant services	13	4,57	2,28	4,94	1,70	15
Change password and user id	14	4,43	2,32	5,06	1,71	14
Bank interest rate	15	4,19	2,49	5,06	2,11	13

Valid N for IB user (listwise) = 149

Valid N for IB Potential Adopter (listwise) = 213

This study noted that the four most popular services (shaded) are still considered the most important online services and seen as the most important services required by both groups. In contrast, both groups of respondents show a discrepancy in the other ten IB services but both groups agree that services on interest rates are not important as represented by the lowest mean for both groups.

Analysing Sample's IB Promptness and Banking Difficulties

The distribution of the sample population shows that the majority of the sample (89.4 %) confirmed they would use IB in the future while the rest (10.6 %) do not intend to use it. The result shows that

47.4 % of the entire sample intends to use IB as soon as IB services are made available to them. Outstanding percentages were distributed amongst the other four categories. Statistically, the average duration for the entire sample to adopt IB fell between category 3 representing a duration of 12 months and category 4 representing six months ($\mu=3.53$ and standard deviation of 1.80). The distribution of the sample population shows that respondents identified some common problems encountered during their previous use of banking services. Results presented in Table 6.5 show that queuing and slow services are both common problems encountered with 69.6 % of the entire sample ($\mu=.69$ and standard deviation of .46).

Table 5 Sample's Banking Promptness and Difficulties

Statement	Responses	Statistics			
		Freq.	%	Mean	S.D
Q5 If Internet Banking services were available to you, when do you intend to use them?	Soon	175	47,4	3,53	1,80
	After 6 months	60	16,3		
	After 12 months	42	11,4		
	After 18 months	10	2,7		
	After 24 months	43	11,7		
	Will not use	39	10,6		
Q7 Using traditional banking services at busy time of day you may encounter difficulties. Please, indicate any of the difficulties listed applicable to you?	Queueing	257	69,6	.70	.46
	Slow services	257	69,6	.70	.46
	No ATM	88	23,8	.24	.43
	Clearing cheques	44	11,9	.12	.33
	Rude teller	111	30,1	.30	.46
	Branches dealing	146	39,6	.40	.49
	Working hours	108	29,3	.29	.46
	Other	35	9,5	.10	.29
Q8 How often do you visit the bank?	Every day	117	31,7	3,45	1,46
	Once a week	100	27,1		
	Once a fortnight	43	11,7		
	Once a month	55	14,9		
	Less often	50	13,6		
	Never	4	1,1		

Customers also encountered problems when dealing with other branches represented by the percentage of 39 %. The distribution of the sample population shows that respondents' visit to the bank were disproportionately distributed. The result shows that more than a third of the sample (31.7 %) visits the bank every day followed by those who visit the bank weekly (27.1 %). Respondents who never visit the bank represented a very small fraction, while less than two-thirds of the respondents completed each of the remaining categories.

The IB–Decision Period

The IB–Decision Period, according to Rogers (1995, p.197), refers to the length of time required for an

individual to pass through the innovation decision process. In line with Rogers' categorization of adopters, the behavioral intention of the participants in this study was also examined based on their adoption time reaction for identifying appropriate groups of adopters with similar characteristics. Rogers (1995) classifies innovation adopters into five categories: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. This study identified respondents based on Adoption Time Reaction (ATR) formulated as those who will never use IB = 0 "rejecters", those who will use it within the period of 18-24 months considered "late adopters", within the period of 6-12 months considered as "early adopters" and "Innovators" for those adopters, identified with the intention to use IB soon or those who are currently users. Figure (1) displays the

Innovation-Decision Period obtained by the study's sample. As shown in the diagram, rejecters and late

adopters are those intending to use IB but in much, later than innovators or early adopters.

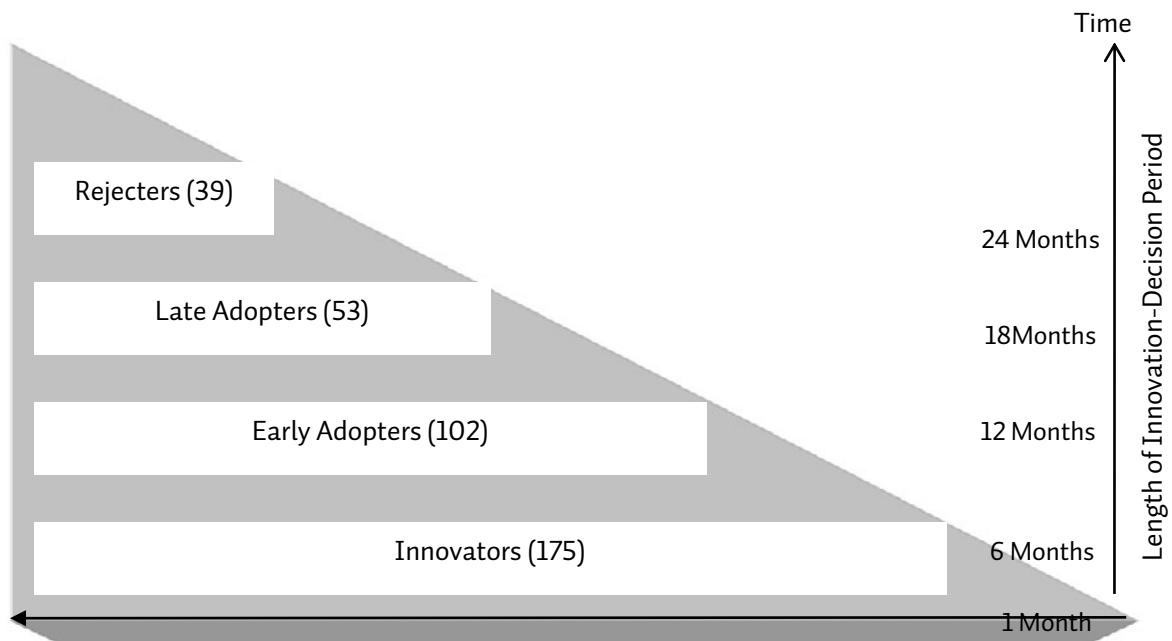


Figure 1 Adoption Time Reactions (ATR)

Comparison of Adopters vs. Readiness Dimensions
The Multivariate Analysis Of Variance (MANOVA) was conducted to compare those respondents who had an early intention to use IB with those who have the intention to react and use IB later. Three hundred and sixty-nine bank customers completed a questionnaire that measured their experience, knowledge, awareness and their previous exposure to IB. Since the study had no theoretical foundation

for ordering the dependent variable in use for this analysis, step-down analysis is not carried out here. In turn, the assumption of homogeneity of regression is not required here. It was assumed that individuals who agreed to use IB earlier would have more positive awareness of IB, more knowledge that is positive, greater previous exposure to the IB and greater experience of IB.

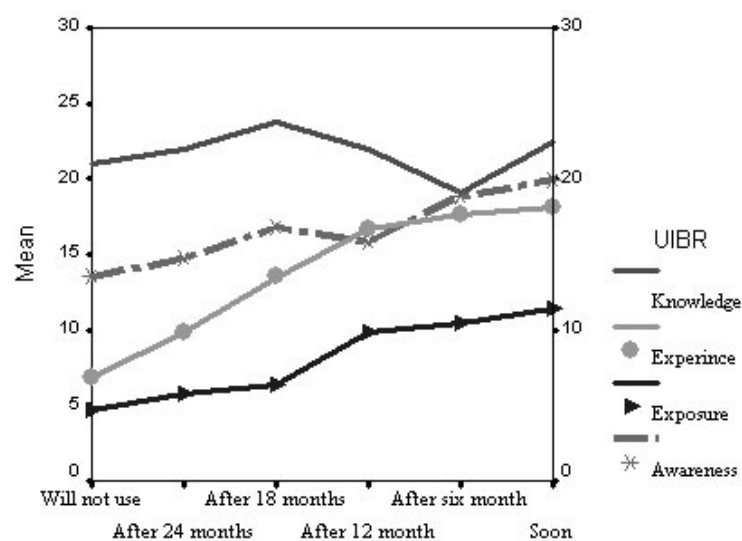


Figure 2 Respondents' IB Time to React Vs UIBR

In order to understand an individual's UIBR, a one-way between-groups multivariate analysis of variance was conducted. The four dependent variables were used: awareness, knowledge, experience, and exposure while the independent variable was adoption time reaction. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance, and multicollinearity, with no serious violation noted. There was a statistically significant difference between the six groups on the combined dependent variables: $F(20, 1194) = 10.637$, $p = .000$; Wilks' Lambda = .581; Partial Eta Squared = .127. When the results for the dependent variables were considered separately, the difference that reach the statistical significance, using a Bonferroni adjusted alpha level of .013 were awareness ($F(5, 363) = 10.238$, $p = .000$, partial eta squared .124), exposure ($F(5, 363) = 23.579$, $p = .000$, partial eta squared .245), and experience ($F(5, 363) = 32.962$, $p = .000$, partial eta squared .312). In addition, inspection of Box's Test of Equality of Covariance Matrices revealed that the homogeneity of variance is obtained at an alpha level of .001.

Comparison of Adopters' Overall Readiness

A one-way between-groups multivariate analysis of variance was conducted to explore the impact of the IB-decision period on readiness. Subjects were divided into four groups according to their time to react (innovators, early adopters, late adopters and rejecters). The independent variable was adoption time reaction. There was a statistically significant difference at the $P < .05$ level in readiness scores for the four groups ($F(3, 365) = 72$, $p < .001$). The actual differences in mean scores were quite acceptable between the groups. Post-hoc analysis using the Bonferroni test indicates that the mean score for rejecter group ($M = 46.08$, $SD = 11.92$) was significantly different from the late adopter group ($M = 53.74$, $SD = 11.50$), Early adopters ($M = 65.32$, $SD = 10.28$) and Innovators ($M = 71.89$, $SD = 12.21$). The test of homogeneity of variances shows that Levene's value is not significant, greater than $p = 327 > 0.05$ level. Therefore, the homogeneity of variance assumption is not violated for the overall readiness (Appendix 2).

Table 6 Means and Standard Deviations of UIBR Variables Categorized by Adopters

Adopters Category	Variables				
	Knowledge	Experience	Explosure	Awareness	Readiness
Rejecters					
M	21,03	6,82	4,69	13,54	46,08
SD	7,54	5,22	2,50	7,69	11,98
Late Adopters					
M	22,25	10,53	5,85	15,11	53,74
SD	5,99	5,74	3,95	6,46	11,50
Early Adopters					
M	20,27	17,25	10,20	17,60	65,32
SD	7,12	4,69	4,95	5,57	10,28
Innovators					
M	22,46	18,06	11,43	19,93	71,898
SD	6,28	5,63	5,40	5,91	12,218

Comparison of Adopters' Psychological Behaviour

A one-way between-groups multivariate analysis of variance was conducted to explore adopters in terms of their psychological behaviour: three

dependent variables were used: attitude, Subjective Norms (SN) and Perceived Behavioural Control (PBC), the independent variable being adoption time reaction. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance, and multicollinearity, with

no serious violation noted. There was a statistically significant difference between the adopter group on the combined dependent variables: $F(9, 883.60) = 26, p = .000$; Wilks' $\Lambda = .56$; Partial Eta Squared = .174. When the results for the dependent variables were considered separately, the differences that reached the statistical significance, using a Bonferroni adjusted alpha level of .017 were attitude ($F(3,365) = 57.65, p = .000$, partial eta squared .321), SN ($F(3,365) = 22.98, p = .000$,

partial eta squared .159) and PBC ($F(3,365) = 64.08, p = .000$, partial eta squared .345). An inspection of the mean scores indicates that in terms of attitude, rejecters reported slightly higher levels of attitude ($M = 3.74, SD = 1.05$) than late adopters ($M = 3.14, SD = 1.07$), early adopters ($M = 2.28, SD = .82$), and innovators ($M = 1.86, SD = .93$). Table 6.7 displays the results as follows;

Table 7 Means and Standard Deviations of Psychological Determinants by Adopter's Categories

Adopters Category	Variables			
	Behavioural Intention	Attitude	Subjective Norm	Behavioural Control
Rejecters				
M	13,23	13,90	16,26	12,59
SD	7,93	7,10	10,72	7,12
Late Adopters				
M	18,49	18,00	18,79	15,58
SD	7,05	6,27	10,76	7,30
Early Adopters				
M	25,58	23,14	24,97	24,72
SD	4,85	3,71	9,31	6,40
Innovators				
M	29,35	24,69	27,98	26,25
SD	5,67	4,34	9,40	7,10

Discussion

The sample population in majority experienced the computer, while the ATM use is the least common technology experienced in terms of time by the sample of respondents. This could be due to that computer usages have preceding ATM technology to the society. Majority had never experienced e-rail, IB, and SMS banking. The finding is useful to motivate research to identify and address the issue of why respondents in the current study exhibited a lack of use of those technologies. It was noted that the technologies of e-rail, IB, and SMS banking are new to Yemeni customers. It seems that the customers could still lack the awareness, experience, exposure and knowledge to deal with these banking innovations. In terms of e-rail, evidence is drawn from this study's finding pertaining to e-rail usage and from similar findings

of Ba-Alawi's (2004) study who claimed that the lack of e-rail use is due to the people's lack of awareness of the existence of this service in Yemen. The e-rail providers should make a greater effort to promote it to the public. In terms of IB, this study found that respondents with a low level of awareness, experience, knowledge, and exposure of IB are either rejecters or late adopters. Therefore, the low percentage of IB actual users could be due to the readiness factor addressed by this study. It is also indicated that users of PCs and the Internet are found to be IB adopters and that respondents who are not users of PCs and the Internet are also not actual users of IB. In terms of SMS banking, similar to IB respondents, those with low levels of awareness, experience, knowledge, and exposure to IB are either rejecters or late adopters. Forecasting the behaviour of all identified IB adopters categories prove that IB adopters behaviour still stronger in the informational level

than in transactional. For instances, customers will tend to behave towards inquiring information on outstanding balances, account statements, exchange rates, utilities payments, cancelation of payment, were all the top five online services in the demand side of current and potential adopters. Customers encountered range of problems such as queuing, slow services, availability of ATMs, clearing cheques, rude teller, and limited working hours, that accompany their usage of the traditional banking services, therefore the findings shows that the majority would behave towards the use of IB in the future. An inspection of the mean scores indicates that respondents scoring high averages of experience, exposure, and awareness are those most likely to react towards the adoption than the others with low averages.

Practical implications – The managerial implications of the study are that the banks in Yemen should work hard to improve IB services that match perceptions of both adopter and non-adopters, mainly the rejecters who do not intend to use the service in the future. Banks should also find how to motivate each segment of adopters to have more experience in all IB transactional internet based services. to for further diffusion of Internet

banking in Yemen, IB providers have to target specific categories of bank customers who have greater income, worldwide business, great access to Internet and longer working hours. Also, banks should educate customers on the ease, the usefulness and the benefit of IB for their business by posting flyers.

A bank is likely to face some risks when moving its customers online from the physical branch office environment. Risks may include for example reduced demand in the optional service delivery channels. If the thrive for cost efficiency is pushing bank towards offering services online, it ought to moving the most profitable customers in the new channels. This will provide banks strategic advantage and lower costs per customer until it reaches a point of maturity.

Future research can extend this research to different contexts. Future research can also employ longitudinal methods to observe the effect of these variables in diffusion of the Internet banking in other context of developing countries.

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Appendix (1)

Table (1) Services Available on Internet Banking

	Information	Administrative	Transaction	Other
Type of Services	Bank profile History	Account balance	Card payments	Open accounts
	Financial products	Financial statement	Cash withdrawal	Live date
	Exchange rate	Cheque Book Request	Pay utility bills	Financial advice
	Consultation	Change Pin Code	ATM	Links To UCW
	New services and announcements	SMS Banking using GSM mobile	Account-Account Transfer	Personal finance management
	FAQ	Application forms	Cheque Stop	e-rial
	Bank's News	ATM Card Stop		
	e-mail communication			

Source: Chang (2004)

:Yemen & Gulf Bank 2005, YCB & IBY

: Ministry of telecommunication (**Yemen**)

Appendix (2): Result Comparison of adopters in Readiness

Descriptive

READINESS

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Rejecters	39	46.0769	11.91722	1.90828	42.2138	49.9400	26.00	77.00
Late adopter	53	53.7358	11.49774	1.57934	50.5667	56.9050	29.00	85.00
Early adopter	102	65.3235	10.27942	1.01781	63.3045	67.3426	40.00	98.00
Innovator	175	71.8914	12.21195	.92314	70.0694	73.7134	41.00	103.00
Total	369	64.7398	14.54743	.75731	63.2506	66.2290	26.00	103.00

Test of Homogeneity of Variances

READINESS

Levene Statistic	df1	df2	Sig.
1.155	3	365	.327

ANOVA

READINESS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28986.693	3	9662.231	72.132	.000
Within Groups	48892.332	365	133.952		
Total	77879.024	368			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: READINESS

Bonferroni

(I) ADOPTR2	(J) ADOPTR2	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Rejecters	Late adopter	-7.65893(*)	2.44173	.011	-14.1361	-1.1817
	Early adopter	-19.24661(*)	2.17897	.000	-25.0268	-13.4664
	Innovator	-25.81451(*)	2.04941	.000	-31.2510	-20.3780
Late adopter	Rejecters	7.65893(*)	2.44173	.011	1.1817	14.1361
	Early adopter	-11.58768(*)	1.95975	.000	-16.7864	-6.3890
	Innovator	-18.15558(*)	1.81461	.000	-22.9692	-13.3419
Early adopter	Rejecters	19.24661(*)	2.17897	.000	13.4664	25.0268
	Late adopter	11.58768(*)	1.95975	.000	6.3890	16.7864
	Innovator	-6.56790(*)	1.44177	.000	-10.3925	-2.7433
Innovator	Rejecters	25.81451(*)	2.04941	.000	20.3780	31.2510
	Late adopter	18.15558(*)	1.81461	.000	13.3419	22.9692
	Early adopter	6.56790(*)	1.44177	.000	2.7433	10.3925

* The mean difference is significant at the .05 level.

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Transforming Inquiry and Action in Interdisciplinary Health Professions Education: A Blueprint for Action

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Abstract

The purpose of this paper is to propose the usefulness of integral theory as a meta-conceptual framework to develop, organize and evaluate interdisciplinary health professions curriculum. The concepts discussed in this essay provide a blueprint for action in the design and development of interdisciplinary health professions curricula. The use of integral theory as a framework for curriculum development leads one to consider the role of individual ego action logics and action inquiry, as a means to stimulate transformational learning among interdisciplinary health professions team members. Dialogic leadership and generative dialogue support implementation of action inquiry practices. Generative dialogue supports state and stage changes in group dynamics. Generative dialogue is associated with transformational learning outcomes. The development of dialogic leadership and communication skills that support and sustain generative dialogue and inter-professional reflection is likely to support the achievement of inter-professional health professions competencies.

Keywords

Health Professions Education, Competencies, Interdisciplinary

Introduction

Interdisciplinary collaboration is valued in health care; however, the practice of interdisciplinarity is a challenge in terms of education and training. Interdisciplinary care requires team work and relies on the individual as well as collective intelligences of the team members. This paper explores several questions. How does an integral perspective influence teaching, learning, and the professional development /socialization, of individuals and teams in health care contexts? From an integrally informed perspective, what are some of the essential concepts that might be developed to create transformational learning experiences

among interdisciplinary health care providers? How do dialogic and generative dialogue leadership skills support reflection and state transitions in group dialogue contexts? What organizational steps and stages of development are necessary to evolve an integrally informed interdisciplinary health profession course or curricula?

First, challenges and tensions between the reality and espoused vision of interdisciplinary health professions education are discussed. Integral Theory as a meta-conceptual framework is proposed as a theory to guide curriculum development and promote interdisciplinary learning. Ego action logics and development associated with an

action inquiry approach to learning are described. The nature of transformational learning is defined. Finally, dialogic leadership skills are described as an essential skill set to support reflection and the generative dialogue that leads to transformational learning. An appendix provides an example of a developmental stage plan which serves as a blueprint for future action.

Literature Review

Interdisciplinary Health Professions Education: Managing the Tensions between Vision and Reality

In June of 2002 the Institute of Medicine convened a Health Professions Education Summit to develop a vision and position on the competencies needed by health care providers in a 21st century health care system. The results of the summit are published in a book, *Health Professions Education: a Bridge to Quality* (IOM, 2003). The vision suggests all health professionals ought to be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches, and informatics. In spite of this charge, little progress has been made in terms of effective implementation strategies or tactics to achieve the vision. Steven Reeves et. al. (2008) conducted a systematic review of over 1000 studies, none of which showed convincing evidence regarding the impact of interdisciplinary education on healthcare outcomes.

Julia Klein (1990) notes that teamwork in health care focuses on the goal of treating the whole patient. Some advantages of teamwork are: greater accuracy of assessments, the benefits of more holistic perspectives, access to more timely referrals and resources, greater client advocacy, the creation of useful data bases and the creation of future treatment plans based on past experiences. Disadvantages to team work include: issues of communication, competition, status, power, and confusion among roles and responsibilities. Additional barriers to team work include: personality differences, historical and inter-professional rivalries, differences in language and jargon, and varying levels of education. Additionally interdisciplinary differences exist in terms of regulations, accountability, payment and rewards, and clinical responsibility (O'Daniel &

Rosenteing, 2008). Using the integral concept of developmental lines there are also the issues related to the cognitive, emotional and moral and aesthetic lines of individual development that interact with the dynamics of the team as a group. Zachary Stein (2007) suggests two main issues related to interdisciplinary work are the complexity of cognition and collaboration and the epistemological validity claims associated with professional perspectives. Such issues are challenging to work through.

Jane Payler, Edgar Meyer and Debra Humphris (2008) conclude that pedagogies for interdisciplinary education have yet to be clearly formulated and that evaluation of such studies suffers from lack of a theoretical framework that embraces the complexity of learning involved in practice based interdisciplinary learning contexts. The IOM (2003) report suggested that a common language or conceptual model would be helpful to enhance patient care, and support interdisciplinary learning and cooperation among the health disciplines. Such a model or theory must embrace and transcend all of the complexities associated with interdisciplinary care, practice, and learning. Such a model ought to attend to individual and collective differences in service of patient care goals. Integral Theory and the AQAL Model (Wilber, 2007) is capable of embracing the multiple perspectives associated with interdisciplinary health professions education and learning. "Integrally informed" is a phrase that denotes a "consciousness, approach or product informed by Integral Theory" (Rentschler, 2006). A brief description of integral theory is discussed next. Integral Theory is a post-metaphysical, post-disciplinary meta-theory useful for analyzing and evolving thinking about interdisciplinary health professions education.

Integral Theory: An AQAL Lens

The word integral means to include bring together, to join, to link, to embrace. Ken Wilber (2000; 2001; 2002a; 2002b; 2002c; 2002d; 2007) has advanced an integral theory based on internal-external, inside-outside, individual and collective perspectives related to experience in the world. "Integral philosophy attempts to include and coordinate the many faces of the Good (the "we"), and the True (the "it"), and the Beautiful (the "I"),

as all of them evolve across the entire spectrum, from their sensory forms (seen with the eye of flesh) to their mental forms (seen with the eye of mind) to their spiritual forms (seen with the eye of contemplation)—a pluridimensional Kosmic mandala of unending embrace” (Wilber 2002, p. 85-86). Integral Theory is synonymous with the term AQAL which is short hand for all quadrants, all-lines, all- levels, all-states, and all-types. Matt Rentschler (2006) defines AQAL as a “comprehensive approach to reality that attempts to explain how time-tested methods and experiences fit together in a coherent fashion.”

Integral insights are desirable in health care, given providers from different disciplines frame and represent health and illness phenomena through different frames of reference and meaning. Doctors, for example, most often look for pathophysiological explanations of disease and illness. Nurses focus on people’s responses to illness conditions. Social workers consider the effects and interactions of family dynamics and interpersonal impacts in the greater community. Psychologists focus on behavior, adaptations, and coping responses of people confronted with illness and or injury. Physical Therapists focus on restoration of function and physical adaptations to illness and or injuries. Patients, rely on all of these health professionals to provide care. An integral approach to health care supports the interdisciplinary goal of treating the whole patient. An integral approach to health professions education may serve to unite the perspective taking stance of health professionals and sensitize them to the multiple perspectives between and among individual, collective, behavioral and social systems dimensions of health care.

The AQAL model provides insights, concepts, principles and practices to support the transformation of learning in the health professions. Use of AQAL and integral theory as a common language can help providers index their activities, share their insights and learn more about phenomena of mutual concern across a number of health care contexts such as patient care, clinical education, science and social systems transformation. Use of integral theory regarding the importance of specific lines, types, states and stages of development can be used to highlight essential concepts and learning experiences that support transformational learning.

Transformational learning through integral design is one of many strategies that can edge health professions educators closer to the vision espoused by the Institute of Medicine to create a 21st century health care system.

The application of Integral theory is well suited for the health professions because it is grounded and committed to good science. Good science, as explained by Sean Esbjorn-Hargens and Ken Wilber, involves attention to:

Instrumental injunctions [which] refer to an actual practice, an exemplar, a paradigm, an experiment or an ordinance. It is always of the form ‘If you want to know this, do this’. Direct apprehension refers to an immediate experience of the domain brought forth by the injunction: that is, a direct experience or apprehension of data (even if those data are mediated, at the moment of experience they are immediately apprehended)...Communal confirmation or rejection is a checking of the results, the data, the evidence- with others who have completed the injunction and apprehensive strands adequately. Thus all kinds of science are in fact empirical in the broadest sense of experiential. This is a much broader definition of science than the narrow definition of sensory experience usually associated with it (Esbjorn – Hargens & Wilber, 2006. p. 534).

Three principles associated with integral theory are: nonexclusion (acceptance of truth claims that pass the validity tests for their own paradigms in respective fields) enfoldment (sets of practices that are more inclusive, holistic and comprehensive than others) and enactment (various types of inquiry disclose different phenomena depending on the quadrants, levels, lines, states and types of the inquirer) (Wilber, 2002d). While there are an infinite number of possibilities for transforming health professions education through redesign, this paper uses an integral lens and concepts from action inquiry, transformational learning theory and dialogic theory and practice to suggest courses and curricula that engage health professionals in different types of learning, reflection and generative dialogue that support transformational learning outcomes.

Action Inquiry and Developmental Action Logics

Action inquiry is a model for social science and social action that is conducted in everyday life. "Action inquiry is a kind of social science that deals primarily with "primary data" encountered 'on-line" in the midst of perception and action and only secondarily offline. Consciousness in the midst of action [is] a special kind of widened attention that embraces all four territories of experience (intuition, reason, one's own action, and the outside world)[and] is the ultimate aim and the primary research instrument in action inquiry" (Torbert, 1991 p. 221).

In describing the epistemological basis for action inquiry Peter Reason and William Torbert (2001) note four key dimensions of an action science. These include: 1) the primacy of the practical; 2) the centrality of participation; 3) the requirement for experiential grounding; and 4) the importance of analogical theory. Reason and Torbert (2002) cite the complementary work of John Heron (1998; 2006) in regard to four ways of knowing: experiential knowing, presentational knowing, propositional knowing and practical knowing. Action research requires attention to first person research/practice that addresses a person's ability to master an inquiring approach to personal inquiry. Action research includes a second person

research/practice that engages face to face group collaborative inquiry. Action research requires and includes third person research/practice by asking how inquiring communities can be established that reach beyond groups to engage and influence organizations, communities and countries. Each of these dimensions is critical in the development of interdisciplinary learning.

Torbert (2004) believes action inquiry is an explicit shared reflection about an organization's mission, and the open interpersonal relationships among people in the organization. Action inquiry enables people to support, confront, and explore the value differences and the performance of the organization and the people in the organization. Intentional use of action inquiry enables people to deal with and resolve the paradoxes and the polarities of inquiry~ productivity; freedom~ control; quality~ quantity; and interactive development of self and others. Action inquiry requires attention to the meaning making frame works of individuals. These meaning making frameworks are a function of a person's stage of ego- development and corresponding action logics. These types and levels of action logics are illustrated with other concepts in Table 1. For each concept lines and levels of development are illustrated with supporting states and stages of development.

Table 1 Stages, States, Type/ Lines and Concepts related to integrally informed Interdisciplinary Health Professions Education

Concept	Lines	Types/Levels	Stages	Stages
Action Inquiry	Ego Development Action-Logics	Impulsive Opportunistic Diplomat Expert Achiever Individual Strategist Magician/Witch/Clown Alchemist Ironist	Assessing Performing Strategizing Visioning Framing Advocating Illustrating Inquiring	Pre-conventional Conventional Post-Conventional
	Theory Practice	Action Learning (I) Applied Science (It) Community of Practice (We) Action Science (Its)	Conceptualization Experimentation Enacted Learning Reflection	Rapid Reaction Repair Review Research Reformulation
Dialogue	Patterns of Action	Movers/Direction Followers-/Completion Opposers/Correction Bystanders/Perspective	Voicing Listening Respecting Suspending Presencing	Awareness Unfolding Participation Coherence
	Generative	Talking Nice	Listening/Project Downloading	Rule-Reenacting
		Talking Tough	Listen/Reload Debate	Rule-Revealing
		Reflective Dialogue	Listen/Empathic Inquiry	Rule-Reflecting
		Generative dialogue	Listen Future Self Presence/Flow	Rule-Generating

For someone who operates at the opportunist level, the dominant task is about gaining power to have desired effects on the outside rule. Opportunists need rules. The Diplomat wants to understand others and often molds their own actions to succeed on their terms. At the Diplomat level, norms rule needs. At the Expert level the task of intellectual mastery through experimental actions to generate new ways of doing business are important. The expert's craft-logic rules norms. At the Achiever level of development the system's effectiveness emerges as important as the achiever weaves together theory, plans, operations, and implements actions in service of outcomes and desired results. At the Achiever level, system effectiveness rules craft logic. At the Individualist level, self-reflexivity supports attention and appreciation of diverse viewpoints in terms of inquiry, action, and productivity. This reflexive

awareness rules system effectiveness. At the Strategist level, a person's self-consciousness and invitational style invites multiple voices and framing and reframing of ideas. This self-regulatory meta-awareness rules reflexive awareness. Finally, at the Alchemist level, the action-logic and interplay of process, action and emergence unfolds through appreciation of the relationships and transformational insights that cultivate reflection and action. The ironist level is rare and beyond post conventional development. These meaning making frames are supported in developmental evolution through specific ways of engaging in inquiry that embraces four dimensions or territories of experience.

These territories include a frame – the assumptions that bound the conversation, the “name of the game” the purpose of speaking. The next territory is

an advocacy – a particular goal to be achieved, an abstract assertion about perception or action. The next territory is addressed through an illustration – a concrete example, a colorful story. Finally, an inquiry – an invitation to respond, an effort to determine the effects of one's action (one's speaking) or other's perspectives on the matter is one way to engage the other in responding to the inquiry (Torbert, 1991). This four-fold simultaneous awareness is also described as: intending/planning acting/effecting or visioning/ strategizing / implementing/ assessing through a variety of action inquiry exercises (Fisher, Rooke, Torbert, 2003). The structured action inquiry is intended to support single loop, double –loop, and triple loop feedback/ learning. Such learning is transformational and requires special attention to reflections gained through generative dialogue (Chandler & Torbert, 2003). The next section defines and explains transformational learning and types and stages of reflection that supports transformational learning gains.

Transformational Learning: Negotiating Meaning through Reflection

Jack Mezirow (1991) contends that learning involves five interacting contexts: a meaning perspective, the communication process, a line of action, a self-concept, and the external situation. Each of these interacting contexts is influenced and affected by the frames and paradigms that govern social action. Mezirow defines learning as “the process of construing and appropriating a new or revised interpretation of the meaning of an experience as a guide to awareness, feeling and action” (1991, p. 35). Interdisciplinary health professions' work involves the negotiation of shared meaning and different types of reflection to support practice. How health professionals negotiate different frames of meaning in planning and executing care for patients is a function of how well they are able to reflect in and on their actions (Schon, 1983). Frames of meaning are influenced as people study relationships between and among tacit and explicit knowledge formulations associated with individual and collective ways of being, learning and reflecting in work based contexts (Raelin, 1997). Through attention to individual and collective learning issues, work based learning requires attention to action

learning, the development of communities of practice/experience, experimentation and reflection. Knowledge that is tacit is a function of an (I) conceptualizations and action learning. Tacit practice functions through experience and learning enacted through communities of practice (We). Knowledge that is theoretically explicit is a function of experimentation and applied science (It) and explicit practices are functions of collective action science and reflection (Its).

Interdisciplinary health professions knowing and learning represents a quadrivium of tetra arising relationships between and among tacit-explicit knowing and individual as well as collective action inquiries and learning in practice based contexts. This learning is mediated by reflection in-and-on action. This is accomplished through conceptualizations and action inquiry, experience grounded in communities of practice. Such communities engage in experimentation and reflection as a means of personal and collective inquiry. Such inquiry requires the development of reflective skills which vary by type and stage.

Mezirow (1991) differentiates three types of reflection. Content reflection is thinking about the actual experience. Process reflection is thinking how to handle the experience. Premise reflection involves examining long held, socially constructed assumptions, beliefs, and values about the experience or problem. According to Mezirow “premise reflection involves, “dialectical presuppositional” logic, a movement through cognitive structures guided by identifying and judging of presuppositions (1991, p.117). “Transformative learning involves reflectively transforming the beliefs, attitudes, opinions and emotional reactions that constitute our meaning making schemes or transforming our meaning perspectives (sets of related meaning schemes) (Mezirow, 1991, p. 223). As individuals move through the state of concrete experience, reflective observation, abstract conceptualization and active experimentation learning occurs (Kolb, 1984). In addition to content, process, and premise reflection there are other types and stages of reflection that support transformational learning processes and are relevant to health professionals in practice.

For example, Griffiths & Tann (1991) have created a five-level stage model of reflection. The first level of reflective practice is instinctive, immediate and

called rapid reaction. The second level is more habitual and often activated on the spot and is called repair reflection. The third type of reflection (review reflection) involves time out for re-assessment and may take place over hours or days. Research reflection is systematic, sharply focused and takes place over weeks or months. Reformulation reflection is abstract, rigorous, clearly formulated and takes place over weeks, months or years. All of these reflective practices are better served and enacted if members of an interdisciplinary team possess and understand the true nature of dialogue, and the transformational learning that emerges as groups intentionally practice generative dialogue. Dialogic leadership is a line of development that supports the enactment and group state transitions that emerge in the context of a generative dialogue milieu.

Dialogical Leadership and Generative Dialogue

William Isaacs (1991) explains human conversation evolves in two potential directions: defending or suspending. Suspending is a state of listening without resistance and dis-identifying which may lead to reflective dialogue. Suspending may lead to an exploration of underlying causes, rules and assumptions and lead to deeper questions and framing of problems. Reflective dialogue often leads to generative dialogue that is creative, inventive and leads to new insights, unprecedented possibilities, and group flow. In contrast, defending in a deliberation conversation has the potential to lead to skillful conversations that use facts and data to answer problems and make reasoning explicit. Suspending conversations promote a dialectic in which the resolution of tension and synthesis of opposites is negotiated. Defending conversations often lead to controlled discussions in which advocacy and abstract verbal brawling devolves into competition, debate and down beating.

Individuals engaged in dialogue are of different types (Isaacs, 1991). Movers provide direction. Followers support completion of and follow through based on the suggestions and leadership of movers. Opposers often times confront or block mover's suggestions and support correction of courses of action. Bystanders provide perspective as they look

at situations from the "outside-in" given their bystander perspective. All of these types, in a proper dialogue, move through states of voicing, listening, respecting, suspending. Voicing is the process that asks the question: "What needs to be said?" Voicing entails speaking the truth of one's own authority and thinking. Listening is the process that asks: "How does this feel?" without resistance or imposition. Respecting is the process of asking the question: "How does this fit?" and requires awareness of the integrity of another's position and the impossibility of fully understanding it. Suspending is the process of asking the question: "How does this work?" and is the suspension of judgment, certainty and assumptions (Isaacs, 1991). Progression through each of these states is a valuable learning experience for members of an interdisciplinary team. Isaacs (1991) notes the core principles in support of dialogue are: 1) Unfolding – there is a constant implicate potential unfolding through and around us. 2) Participation – as illustrated by the principle, "I am in the world and the world is in me." 3) Coherence- everything is already whole; I must look for the ways that it is. 4) Awareness- self-perception: "I am aware of many different voices within myself" (Isaacs, 1991 p.420). These principles echo and resonate with an integral theory and support transformative practices and learning.

Olen Gunnlaugson (2006; 2007) observes group states of consciousness shift as group members evolve through the four fields of dialogue: talking nice, to talking tough; to reflective dialogue and then generative dialogue. Each of these fields or types of dialogue requires an attentive psychological state and has a corresponding stage. Talking nice activates a listening state of down loading and projecting which supports rule-reenacting. Talking tough activates the listening state of reloading/debate that supports rule-revealing. Reflective dialogue activates states of suspending, respecting, listening, and presencing through empathic inquiry and supports rule-reflecting. Finally, generative dialogue activates a group state of presence and flow that allows future selves to listen which support the creative process of rule generating where new insights and possibilities produce collective flow and transformational learning gains.

The Vision of an Integrally Informed Health Professions Curriculum

There are parallels between individual and organizational action inquiry stages (Fisher, Rooke and Torbert, 2003). At the organizational levels development proceeds from conception to investment, to incorporation to experiments to systematic productivity, to social network to collaborative inquiry to foundational communities of inquiry to liberating disciplines. Such a developmental trajectory provides a blueprint for future action (See Table 2). Action inquiry is the process of engagement and scientific study related to interpersonal interactions. Dialogic and generative dialogue leadership skills are essential ingredients to support interdisciplinary reflections and transformational learning.

Conclusions

If interdisciplinarity is a means of solving problems and answering questions that cannot be satisfactorily addressed by using single methods or approaches, then integral theory may be a way to advance the field of interdisciplinary inquiry. Integral theory is useful and provides direction for health professions educators who are invested in creating interdisciplinary models of practice, education and research. Through application of integral theory and attention to lines, levels, states, stages and types, educators can begin to create and develop learning experiences in service of transformational learning goals. Such courses and curricula can be framed and supported using action inquiry principles and practices. The development of dialogic leadership and communication skills that support and sustain generative dialogue and reflection may facilitate the achievement of 21st century core competencies envisioned by the Institute of Medicine (2003) in its quality health professions education report.

Table 2 Organizational Development Stage Plan for Transforming Inquiry and Action in Interdisciplinary Health Professions Education

Conception: Dreams about creating a new organization	An integrally informed interdisciplinary health professions curriculum is a dream/vision worth pursuing. Courses and curricula organized using integral theory might include attention to individual action logics, associated with personal stages of development. Action Inquiry and dialogic principles and practices are envisioned to support reflection and transformational learning over and through time.
Investments: Spiritual, social network, and financial investments.	There is a need to identify social networks as well as a spiritual and financial investment to realize the vision of integrally informed health professions curricula.
Incorporation: Products and services actually rendered.	Examples of such products and services might include consulting, coaching, and or leadership development assessments that would support and enable an interdisciplinary health professions courses and curricula to be enacted.
Experiments: Alternative strategies and structures tested.	Small pilot projects or experiments using a course organized around integral theory could inform the development, implementation and evaluation of the dream/conception.
Systematic Productivity: Single structure/strategy institutionalized.	Establishing an integrally informed interdisciplinary health professions course or curriculum within a health science school would institutionalize the strategy.
Social network: Portfolio of distinctive organizational structures.	The success of an integrally informed interdisciplinary health profession course could stimulate collaborative inquiry among health professionals and other institutions or agencies of learning. Success of such a venture depends on the match among the mission and vision of health professions educators and successful achievement and alignment of strategies, goals and outcomes.
Collaborative inquiry: Self-amending structure rules matches dreams and mission.	The success of a visionary curriculum devoted to transformational learning, supported and informed by integral theory, action inquiry and generative dialogue may lead to the development of collaborative inquiry whereby the nature of the rules and cultures that govern interdisciplinary health professions education would be open to influence and evolutionary, transcendent change.
Foundational Community of Inquiry: Structure fails, spirit sustains wider community	Based on the results and experiences gained through time; old curricular structures would begin to fail, and new curriculum models might emerge creating liberating structures for teaching, learning and care planning in a re-designed 21 st century health care system.
Liberating Disciplines: Widens member's awareness of incongruities among mission/strategy/ operations/ outcomes and skill at resolving them	The nature of interdisciplinary health professionals education and work is transformed through integrative principles and practices such as nonexclusion (acceptance of truth claims that pass the validity tests for their own paradigms in respective fields), enfoldment (sets of practices that are more inclusive, holistic and comprehensive than others) and enactment (various types of inquiry disclose different phenomena depending on the quadrants, levels, lines, states and types of the inquirer).

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Eye Tracking in User Research

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Abstract

Eye tracking has been broadly used in cognitive sciences and the data is usually analyzed with quantitative methods. This paper gives insights into eye tracking in general, in its methodology and the specifics within it. The aim is to discuss the qualitative use of eye tracking in user research. This article describes how eye tracking data could play an important role in the user research when aiming at understanding the users and the user experience. Broader study is needed on utilizing eye tracking data in catalytic or reflective ways in interaction between the users, developers and researchers in product- and service development.

Keywords

Eye Tracking, User Research, Quality Research

Introduction

Eye tracking can bring added value to user research by providing us insights that would not be available with more conventional research methods. These insights are related especially to user's visual attention, for instance, in usability testing eye tracking can tell us where the user was looking at when making a decision. (e.g. Renshaw & Webb, 2007; Sundstedt, Whitton & Bloj, 2009 ; Nahman, 2001 ; Pretorius, Calitz & van Greunen, 2005; Schiessel, Duda, Thölke & Fischer, 2003)

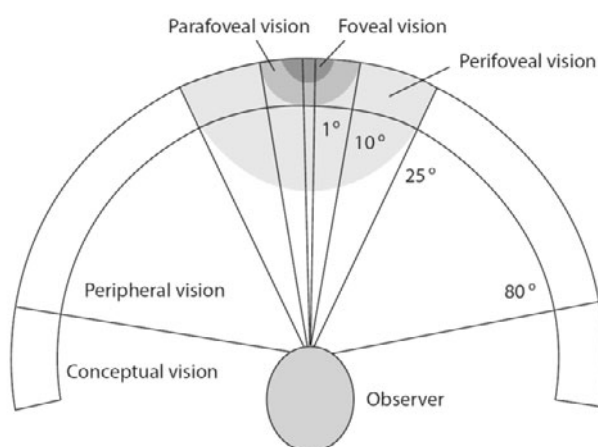
Rayner (1998) points out that the eye tracking research is entering its fourth era with the emergence of interactive applications. The first era (ca. 1879 -1920) was defined by the discovery of many basic eye movement facts. The second era (ca. 1930-1958) was handling the more applied research focus in relation to the behaviourist movement in experimental psychology. The third era (ca. 1970 – 1998) is characterized by improvements in eye movement recording systems, their accuracy and easily obtained measurements.

According to Goldberg, Stimson, Lewenstein, Scott & Wichansky (2002), there are two ways to proceed with analysing of eye tracking data. Either top-down, in other words, based on cognitive theory or design hypothesis, or bottom-up, which is entirely based on observation of the data without predefined theories relating eye movements to cognitive activity. What can be measured then? The commonly used metrics are e.g. fixation (duration, overall, rate and number on each area of interest), area of interest, scan path, gaze duration (% and mean on each area of interest) (Jacob & Karn, 2003 see also for eye tracking metrics used in 21 usability studies discussed in the study.)

The most common eye tracking metrics do not provide the answers to the question interesting many user researchers; the question why? Thus this paper aims to discuss the qualitative analysis of eye tracking data in dialogue with the user. How could the user research benefit from the information gathered via eye tracking in real life environment, in the everyday environment of people? This discussion is based on a literature review and pilot study.

Literature Review

Our eyes are collecting so much information on the surrounding environment that our brain is not able to process all of it. Only the needed information is extracted by using the selective visual attention. The eyes have limited resolution and the human visual acuity is related to this fact and also to our ability to resolve fine details. (Sundstedt & al., 2009) When gazing an object, the eyes move so that the image of the target object appears on the fovea of the retina. The humans have higher visual acuity in the fovea. As it can be seen from the figure below, fovea covers approximately one degree of visual angle. (Sundstedt & al., 2009 & Lukander, 2003) Visual angle means the measured degree of eye movements, one degree's visual angle spans approximately 1 cm on a distance of 57 cm from the viewer's eye (Lukander, 2003).



Picture 1 Schematic representation of the human visual field (Sundstedt, 2009).

The eyes are moving several times per second containing micro-movements spanning sometimes only a few pixels (Ehmke & Wilson, 2007). To gather accurate information on the surrounding environment, the human visual system has developed a number of methods it needs for bringing the objects of interest to the area of sharp vision in order to be able to stabilize the image on the fovea (Lukander, 2003). The human visual system is using five basic types of eye movements: saccades, smooth pursuits, vergence, vestibular ocular reflex and physiological nystagmus (Duchowski, 2007). Duchowski describes the eye movements as follows:

- Saccades are both voluntary and reflexive eye movements and they last from 10-100ms. During the saccade no visual information is normally obtained. Saccades are ballistic, meaning that the destination of the saccade cannot be changed once it is started.
- Smooth Pursuits are used to track visually moving target.
- Vergence movements are used for depth perception.
- Vestibular ocular reflex movements are used to fixate the eyes on an object even if the head rotates.
- Optokinetic nystagmus motions are used to account the motion of the visual field.
- Fixations occur between eye movements and they often last for about 200-300 ms.

Approximately 90 percent of viewing time is spent on fixations (Duchowski, 2007). The eyes are never completely still; these small movements in the eye are called tremors, drifts and microsaccades, however, during the fixation the image is held almost still in the retina. Eye movements can be divided into two categories, stabilising movements and saccadic movements. Stabilizing movements try to hold the image on the retina steady and the saccadic movements bring the objects of interest to the area of sharp vision. Stabilizing eye movements include fixations, smooth pursuit movements and vestibular ocular reflex and optokinetic reflex. Saccadic eye movements include saccades and vergence movements. (Lukander, 2003)

Eye Tracking Research

According to Nielsen & Pernice (2010), eye tracking reveals another level of user behaviour by providing a more detailed level of behavioural data to be analyzed. It enriches the understanding of peoples approach to the sites and reactions to words and pictures in order to communicate better with

interactive content. Sundsted & al. (2009) are emphasizing that important objective information can be revealed via eye tracking and it gives the opportunity to take the human observer into account in the design. According to Nahman (2001) user's eye movements can offer additional insights when dealing with design solutions related to various elements on the web site. Eye tracking may give answers to questions such as reasons of failure when using the web, and then design recommendations are not needed to be implemented by trial and error.

Just & Carpenter (1984) have been formulating the so called eye-mind hypothesis, which has been one of the reasons of the growing interest towards today's eye tracking research. In their assumption the target fixated by a gaze of a user indicates what the user is thinking of, and that there is no lag between what is been fixated and what is been processed under a cognitive task. Following users gaze path allows for the process of observing a subject's visual attention. (Lukander, 2003; Ehmke & Wilson, 2007; Nielsen & Perice, 2010.)

Schiessel & al. (2003) have been discussing the added value of eye tracking in usability studies and media research. They showed that use of eye tracking gives higher validity of usability data by being able to unveil response biases due to artificial testing environment. They also point out the practicability of eye tracking data. By being able to provide insights in the origin of the problem, eye tracking allows analysis of problem stages such as perception or comprehension. On the other hand (e.g. Hyrskykari, Ovaska, Majaranta, Räihä & Lehtinen, 2008; Koivunen, Kukkonen, Lahtinen, Rantala, Sharmin, 2004), gaze direction alone does not provide us the answers why users looked at the point they looked at. In other words prolonged gaze to some object does not necessarily indicate that there are some problems with understanding its meaning, or that this particular object is especially interesting to the user. Something is simply raising the visual attention of the user, but if we want to find out the reason why, we should combine eye tracking with other methods of investigation.

Hyrskykari & al. (2008) have been comparing the outcomes when using concurrent think-aloud and retrospective think-aloud. They state that retrospective think-aloud produces significantly more verbal data than the original think-aloud

method. Users are also more relaxed and motivated to talk and provide useful information on improvement of the web sites when using the gaze path playback after the actual task performing stage. The replay of eye tracking data for the users makes it easier for them to recall their decisions and thoughts during the test. This is called Post Experience Eye Tracking Protocol (PEEP), as described further by Ball & all 2006. (Ehmke & Wilson, 2007; Hyrskykari & al., 2008.)

Nielsen & Pernice (2010) encourage the use of head-mounted eye trackers when studying users moving in the real world. Such equipment is useful for shopping behaviour and usability studies of physical devices. Examples are run out-of-the-box studies for unpacking and starting to use some electronic devices.

Visual perception has a significant impact on finding one's way and orientation. In a study conducted in a nursing home for patients with mild dementia and independent in mobility, a wireless mobile eye tracker was used to obtain information on how the signposts were perceived. The eye tracking study provided evidence that the sign information was placed incorrectly for nursing home residents. It also revealed what caused distractions and what kind of signage was more effective. (Schuchard, Connell & Griffiths, 2006.) Wilfinger, Weiss & Tscheligi (2009) studied shopping behaviour in order to deduct design implications for indoor guidance systems in stores by exploring orientation strategies. They used spectacles camera instead of a mobile eye tracker, though applied in similar manner. In their study pre-structured interviews accompanied the field study with the spectacles camera, think-aloud and observation.

Visualised eye tracking data plays a crucial role in the qualitative approach to eye tracking. The best way to visualise eye-movements is by gaze replay (also known as gaze overlaid video) in real time or in slow-motion (Nielsen & Pernice, 2010). Additional visualisation forms of eye tracking data are e.g. the heat maps (fixations of many users) and scan path or gaze plots (fixation of one user).

Application Areas of Eye Tracking

From the system analysis point of view the nowadays existing eye tracking applications can be divided into two categories: interactive and diagnostic systems. Objective and quantitative evidence on user's visual and attentional processes can be provided by diagnostic use of the eye tracker. Diagnostic eye tracking involves recording eye movements over time in order to find out user's attentional patterns over a given stimulus. The stimulus does not usually need to react or change to the gaze. On interactive systems, user's gaze is interacting with the application, the eye tracker is serving as an input device. (Duchowski, 2007) This paper focuses on the diagnostic use of eye tracking.

There are two general techniques for studying eye movements; either by measuring the position of the eye relative to the head or by measuring the orientation of the eye in the space. The latter uses video based corneal reflection (also known as Purkinje Reflection or Purkinje Image) system eye tracker, and it is also the one used most commonly today. (Duchowski, 2007.) Video-based eye trackers use relatively inexpensive cameras and image processing hardware and are most suitable for the interactive use. Both table- and head mounted systems are identical in optics with the exception of size. (Duchowski, 2007.) Applied eye tracking research has been getting more common in line with lowering the cost of equipment, easy to use systems and analysing software.

In the industrial engineering and human factors, eye tracking is used e.g. in aviation, driving and visual inspection of goods. In aviation, human machine interaction behaviour studies with the experienced and novice pilots have been conducted e.g. in visual interaction with electronic maps, information selection and management and concerning situation and mode awareness in the modern cockpit. In driving, eye tracking studies help to understand the reaction times, effects on aging, luminance and clutter for driving. Studying the nature of driving task is useful for developing the driver training and accident countermeasures. Eye tracking can also be used to study the visual inspection of goods and services. (Duchowski, 2002.)

Previously eye tracking has been widely used in neuroscience, psychology, industrial engineering

and human factors, marketing and advertising and computer science. The next chapters describe shortly some user research related application areas of eye tracking: marketing, human computer interaction and perception of design.

Marketing

According to Duchowski (2002), insights of consumer's dispersion of visual attention of advertisement can be provided by eye tracking. Ad effectiveness can be studied in e.g. copy testing, images, video and graphics. Rayner, Miller & Rotello (2001) studied eye movements on print advertisements and came to the general conclusion quite consistent with the classical study by Yarbus (1967); the goal of the viewers matters also when looking at an ad. The given task influenced whether the viewers looked more at the text or at the pictorial part of the ad. They mention that the nature of the ad per se influences looking patterns. Based on the goals - instead of jumping back and forth between text and picture, they gaze at the part of the ad, which supports their goals and after that scan information less relevant to them, or use that information for confirmation.

Human Computer Interaction

As the Internet has become a part of everyday life, users no longer tolerate poor usability and the demand for usability analysis is increasing (Ehmke & Wilson, 2007). Nielsen & Pernice (2010) have been conducting a major eye tracking study on web usability with more than 300 participants. The goal was to study people's common viewing patterns and behaviour when using purposeful web sites. More specifically, they were testing the theories about usable and unusable web design. They investigated eye tracking data for new usability findings and determinate if there are some findings which can be collected with eye tracking only. Good eye tracking usability practices were also collected.

Emke & Wilson (2007) have summarized eye movement metrics and related usability problems from the eye tracking research literature. They pointed out the importance to study not only the metrics related to a single eye tracking measure, but also the combination of patterns reflecting the structure of user behaviour when countering a problem. Through their study they produced an

interesting though exploratory table of correlations between eye tracking patterns and usability problems.

The model of visual attention when viewing web pages can be important for both web designers and the end users. By carrying out the study to find out the salient regions of web pages Buscher, Cutrell & Morris (2009) were able to identify general location based characteristics of visual attention for web pages and generate a model for predicting the visual attention that individual page elements may receive. Like Buscher et al., Nielsen & Pernice (2010) are also arguing that eye tracking can be used to improve page layout and meet the requirements of the users. Eye tracking can also be exploited when dealing with cost effective design of virtual characters in virtual environments (McDonnell, Larkin, Hernandez, Rudomin, & O'Sullivan, 2009).

Implicit relevance feedback and the interaction between the searcher and the information retrieval-system was studied by Moe, Jensen & Larsen (2007). In the study they used a qualitative and exploratory approach to identify potentially useful features from eye tracking data. Although the qualitative identification of features of eye tracking data is time consuming, it is possible to identify some features by qualitative inspection of the eye tracking gaze replays. Behaviour involving shorter gazing or small texts were proved hard to observe qualitatively. The reason for using the qualitative analysis and not the algorithmic one was not only the lack of resources. This approach provided a possibility to investigate the value of a number of features without implementing the algorithms to automatically identify these features. (Moe & al., 2007)

Perception of Design

In the research aiming at developing methods for perception of design products, eye tracking was used for comparison of how designers and non-designers perceive design products and also for comparing 3D design products and their computerized 3D models (Räihä, Koivunen, Rantala, Sharmin, Keinonen, Kukkonen & Lahtinen, 2006). Koivunen, Kukkonen, Lahtinen, Rantala & Sharmin (2004) found out that the task given to users affects their gaze paths even without any predetermined task. According to Kukkonen

(2005), relations between gaze and different aspects of design evaluation may be used for the development of combined eye tracking and design of evaluation methods. Application of methods developed for perception of design to real design cases could be helpful when evaluating the visual aspects of the product design. On the other hand, as mentioned in Räihä & al. (2006), there is a lack of research in the domain of using gaze data in the evaluation of perception of design. The area seems to be methodologically challenging, hence, some continuing basic research on the topic will be needed.

Methodology

In general, eye tracking has been used especially in the area of cognitive sciences. The data gathered via eye tracking is analyzed by quantitative methods measuring the gaze and eye activities. According to Renshaw & Webb (2007), eye tracking will reliably reveal where people look at in real time and where they don't. The assumption against eye tracking stresses that an expert might easily be able to recall what were the secret shortcuts the expert has used when using the application, or it can be said where the child is looking when being re-read a sentence of a story. In reality tracking where the user is looking at is possible with an eye tracking device, however, it is difficult with more conventional evaluation methods. Sundsted & al. (2009) argue that classical think-aloud protocol or questionnaires can be used to discover what people looked at during the experiment, but they rely heavily on user's memory capacity and the ability to describe in sufficient manner what they see. The classical study by Yarbus (1967) argues that user's scan path is varying depending on the task given, in other words, the eye movements when looking at the scene were influenced by the goal of the viewer.

A structural literature review was conducted with around 50 publications in the area of eye tracking (as presented in Table 1.). The aim was to discover the experiences and findings on qualitative usage of the eye tracking data especially in the real life context user research. The structural literature review concentrated in following possible contents of the publications: qualitative approach used, method used, use context of eye tracking and gained outcomes. This article consists of a rather

broad review of the eye tracking literature in general because of the small number of eye tracking literature with the qualitative approach. Reflection to the qualitative usage possibilities of eye tracking in user research is based on the literature review and conducted pilot studies.

Pilot Study

This paper describes one pilot study conducted by the Laurea User Driven Innovation Centre, testing the use of eye tracking in real life context. The pilot study was conducted in the framework of library development. However, the main aim of the pilot was to test the how the visualised eye tracking data (gaze replay) could be used in the dialogue with the users. The method used in the study combines eye-tracking, think-aloud, interview and future workshop.

The study consisted of three main phases. In the first phase, the first impression with free viewing task followed by task implementation was conducted with naive participants. In the second phase, the post experiment interview took place. Between the second and third phase, the eye tracking and interview data was analyzed qualitatively and questions for the future workshop were compiled based on the analysis. The third phase contained a dialogue enhanced by the visualised eye tracking data. The gaze replay was reflected and discussed in a dialogue with the users, librarians and developers as a part of a future workshop. The data gathering equipment was SMI iView xHED, head-mounted eye-tracker. The mobile eye tracker records a scene video (the scene

as seen by the user) and gaze video (the gaze, as it moves on that seen scene). In this experiment the tracker was calibrated for the stimulus distance of around three meters. The probable parallax error in accuracy when moving freely in the library settings was not considered crucial, as the interpretation of the data was qualitative. Think-aloud audio was recorded simultaneously with the iView xHED eye tracker system. Due to the first impression part of the study, the participants were naive users of the test library, the purpose of the study was not revealed to them in advance either. Other requirements for the selection of participants were not settled. As the pilot was experimental, only two participants of initial three were taking part in the eye tracking experiment. Two additional library users were invited to participate in the future workshop. Also two librarians were engaged with it. In the library study the aim was to track the spontaneous reaction, to find out what raises the first attention of the user when entering the space. According to Flora (2009), our brain makes up a first impression based on signals given off by the new experience. The assessment of this impression and the accuracy of the judgments of people depend on the observer and the people being observed. As Moyersen (2009) states, eye tracking can provide objective data of the consumer behaviour towards products at the very decisive first moment of eye contact on them. He continues that to a certain extent the eye movements reflect what makes an impression on people. These ideas motivated to implement the tracking of first impression via free viewing task as one of the tasks in the pilot study.

Table 1 Reviewed literature

Author (-s), year of publication	Article/Book, publication details
Aula, A., Majaranta, P. & Riih�, K.-J. 2005.	Eye-Tracking reveals the Personal Styles for Search Result Evaluation. M.F. Costabile & F. Patern� (Eds.) INTERACT 2005. PP. 1058 – 1061, 2005.
Andersson, R., Nystr�m, M. & Holmqvist, K. 2010.	Sampling frequency and eye-tracking measures: how speed affects durations, latencies, and more. <i>Journal of Eye Movement Research</i> 3(3), 6, 1-12
Ball, L. J., Eger, N., Stevens, R. & Dodd, J. 2006.	Applying the PEEP method in usability testing. <i>Interfaces</i> , 67(Summer 2006), 15-19.
Bednarik, R. & Tukiainen, M. 2008.	Temporal Eye-Tracking Data: Evolution of Debugging Strategies with Multiple Representations. ETRA 2008, Savannah, Georgia, March 26–28, 2008
Boening, G., Bartl, K., Bardins, S., Schneider, E., & Brandt, T. 2006.	Mobile Eye Tracking as a Basis for Real-Time Control of a Gaze Driven Head-Mounted Video Camera. ETRA 2006, San Diego, California, 27–29 March 2006.
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Gu, E., & Badler, N. 2006.	Visual Attention and Eye Gaze During Multiparty Conversations with Distractions.

	<i>Intelligent Virtual Agents</i>
Ehmke, C. & S Wilson, S. 2007.	Identifying Web Usability Problems from Eye-Tracking Data Published by the British Computer Society <i>People and Computers XXI – HCI... Proceedings of HCI 2007</i> Linden J. Ball, M. Angela Sasse, Corina Sas, Thomas C. Ormerod, Alan Dix, Peter Bagnall, and Tom McEwan (Editors)
Hornof, A. J., Zhang, Y., & Halverson, T. 2010.	Knowing Where and When to Look in a Time-Critical Multimodal Dual Task. CHI 2010: Something Eye Catching. Atlanta, GA, USA.
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Kern, D., Marshall, P., Schmidt, A. 2010	<i>Gazemarks - Gaze-Based Visual Placeholders to Ease Attention Switching</i>
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Results

The qualitative analysis of the reviewed research literature on eye tracking confirmed the assumption that qualitative data analysis wasn't really present in the eye tracking research. The majority of the research articles written on the area interpret the eye tracking data statistically. In the literature review, only two publications presented directly the usage of eye tracking data in qualitative manner. This did not mean that the qualitative approach would not have been used at all, but encouraged the writer to discuss and test more freely the idea of analysing (visualised) eye tracking data in qualitative manner in dialogue with users. Eye tracking is often conducted in a laboratory environment. According to Duchowski (2007), the main reason is better control of the test situation; also, control increases the internal validity. However, the smaller and portable equipment has become lower in cost and field experiments can be conducted with them. Also the table mounted systems can be transported and experiments conducted "on site".

To test the idea of using the eye tracking for user research in real life context and analysing the data qualitatively in dialogue with the users some pilot studies were conducted. This paper reports and reflects merely the pilot study in the library settings. The case dealt with user centered design of the library space- and functions in dialogue with the users, librarians and the researchers.

Data was collected by eye tracking with think-aloud. Recording contained the scene video with the gaze cursor indicating participants eye movements. Instructions for think-aloud were given without revealing the experiment; also the calibration was done in other location than the library. Post experiment interview was conducted after the eye tracking. The interview was also

recorded by using the audio recording of the eye tracker. In the task implementation part the tasks were read out to the participants, the whole process was recorded with the eye tracker. Also a short questionnaire was used to collect the background information on participants; it reflected the usage of library, gender and age. Two researchers observed the eye tracking experiment. Data collection continued in future workshop where ideas for the development of the library space as physical and virtual living room were shared and solutions brainstormed.

The experiment included both free viewing and task implementation tracked with the eye tracker. In the free viewing phase of this experiment the eye tracker revealed what the users were looking at to make up the first impression of the library space; how they look at it and words they used while looking at it. After this the participants were instructed to locate various materials and signs in the library space. Think-aloud method was used in all phases of the experiment.

After conducting the experiment with the naive participants, the aim of the study was revealed to the participants. Then the first impression of the space was discussed in a short post experiment interview. Post experiment interview had also questions related to the experience of taking part in the eye tracking experiment. Recorded eye tracking data was analysed via the gaze replay combined with the think-aloud and interview. The main purpose was to analyse the data together in the future workshop in reflective manner. Therefore questions to enhance the workshop discussion were developed based on the analysed data and workshop theme. The questions were related to the first impression and to the use of library.

The gaze replay was used in the future library workshop as inspiration material and discussion wakening. The test participants attended the

workshop as well. It is possible to watch the gaze replay in normal speed or in slow motion, depending on the depth of the needed analysis on different interest areas.

The gaze replay includes the scene video and the gaze marked with the red circle, as shown in the snap shot of the conducted study below. In this workshop the gaze replays were seen in normal speed with some pausing followed by the questions and discussion with all of the participants. This part of the workshop took 35 minutes.



Picture 2 Using the SMI iView xHed in the library



Picture 3 Snapshot from the gaze replay in the library space's pilot study

Using the eye tracker in real life context may influence user's natural behaviour. The aim is to reach as natural behaviour as possible; otherwise the conclusions made by the study may lead to errors. As in the pilot study, participant felt the use of the mobile eye tracker in the library with other people so distracting that it was hard to carry out the initial task, which was free viewing of the library for the first time including the think-aloud protocol. However, when moving ahead to conduct the task

viewing part of the study with the researcher on the side, the natural behaviour was easier. This was also verified in the post experiment interview by the user. Another participant stated how wearing the eye tracker was forgotten immediately, already before the actual experiment started. It can be assumed that the character of the participant is relevant when considering the natural behaviour of participants in the real life context carried out experiments. Merely the use of eye tracking alone without think-aloud might affect the feelings. The follow up of the actual experiment with an interview and the joint look at the gaze replay videos gives additional insights in user's normal behaviour.

The ability to evoke and maintain the dialogue between the key stakeholders via the eye tracking data was the main research theme in the pilot study. The visualised eye tracking data and the questions enhanced the dialogue between the stakeholders, lively discussion took place and lot of new insights were gained in the future workshop. All the participants were actively engaged in the discussion and the nature of the data proved to be usable in terms of dealing with the gaze replay in this manner. Brief qualitative comparison of the free- and task viewing patterns brought out similar findings as stated in the previous research; task viewing alters the viewing patterns of the users. As "everything happens" in an instant, we have to be able to determine what we see "at first sight" and what in that "first sight" makes up the first impression. In this context, when aiming to track the visual attention of the user; eye tracking seems function well combined with think-aloud and interviews.

Results from the point of view of the case of the study eye tracking revealed e.g. eye-catching notices, horizontal instead of vertical eye-movements along bookshelves and unnoticeable shelf signs. In general this innovative pilot produced otherwise unreachable user information and provided a way to understand and develop library services from the users point of view.

Conclusions

Based on this paper there is a need for broader study on utilizing gaze replays in catalytic or

reflective role in the interaction between the users, developers and researchers.

The visualised eye tracking data enhances the dialogue with the user. Gaze replays or other forms of visualisation of the eye tracking data such as gaze plots of the paper prototype usage, can provide new insights for the researchers. In an interview situation interviewees are usually restricted to memory capacity only. The visualisation of eye tracking data offers information which can enhance the dialogue among the users and developers.

When analysing the eye tracking data together with the users, it is possible to gain deeper understanding of the user behaviour. This can be reached by analysing the findings together, by gathering the comments and feedback from the experiences after the experiment, and by formulating new research questions based on gathered information. After the first data analysis specified questions may be addressed to user(s) in order to reach the additional information needed. The found data can inspire new research questions and areas, and give insights or ideas for the needs of product- and service development.

In the pilot study of the library space, it was possible to gain useful information on the first impression of the library space by the gaze replay with the think-aloud data and the interviews. Conducting the post experiment interviews and watching the gaze replay videos together with the users were complementary to each other and verified the first findings done by the researcher herself when analysing the data.

To get some desired answers on the interesting why-questions related to users and their behaviour, eye tracking needs to be combined with other methods. One method to get more out of the eye tracking is to use so called retrospective think-aloud method (e.g. Hyrskykari & al. 2008). The experiences with the pilot studies were encouraging for analysing the eye tracking data qualitatively. The dialogue with the users enhanced by the gaze overlaid video may bring more accurate insights in the user's needs, wishes and grounds for their actions. Especially when combined with the think-aloud protocol and interviews, gaze replay gives detailed information about the issues drawing the attention of the user and his or her thoughts.

However, it is also important in user studies to maintain the natural behaviour and patterns of usage in order to be able to make reliable conclusions. In some cases this might be jeopardised due to how taking part to the eye tracking experiment in real life context influences the behaviour of users.

Eye tracking could be used in the area of how people perceive things in their environment and how they understand these. This is the case when researchers aim at, for instance, discovering user's visual perception and attention towards the environment, people and their actions, or products and services as seen by the users in the areas such as ubiquitous computing or 3D modelling. Being able to find out how the users really perceive these would help the product- and services designers in their tasks. Another interesting research area for qualitative approach to eye tracking could be people in their everyday working environment. Interesting cases are how novices and experts work or the possibility to reveal tacit knowledge of experts. First impression is often the lasting one. As this paper indicates, eye tracking is also a way to track the first impression of a certain artefact, environment or even a person. The cognitive biases of each individual affect the evaluation of the user experience. The findings of the first impression study by the eye tracker and combined methodologies can be used to improve the first impression for other users in further encounters.

It appears that qualitative analysis of the eye tracking data reveals adequate information on users. This approach can be used as one of the tools for the researchers when analysing the user behaviour and trying to get deeper in to users' lives' and thoughts. New research questions can be raised from the analysis both via researches own views and via the dialogue with the users. The complexity of eye tracking equipment does not make it possible to use eye tracking in a manner of self-documentation. Nevertheless, there is some similarity in the visual nature of the gaze replays as in the pictures taken by the users in design probes studies. It is interesting how these kinds of visual materials help to reflect on earlier experiences and re-live them. It would also be interesting to use the gaze replays as "mirror material" in change laboratories. The change laboratory is a method for carrying out developmental work research to study and develop work practices. With this method

problems in daily work at the work place as well as the development of the future vision are identified, analyzed and implemented together. (Virkkunen, Engeström, Pihlaja, & Helle, 2001)

This paper has described how eye tracking can be applied both quantitatively and qualitatively in user research, despite of the small number of articles with the qualitative approach; the main aim in this study was to discuss the use of the eye tracking data qualitatively. Based on the previously presented research in this article and experiences from pilot studies, eye tracking can be considered

as a potential methodology in user research in real life context. Especially combined with other methodologies such as pre- and post-experiment interviews, observation, think-aloud and retrospective think-aloud or workshops and other types of group activities with the eye tracking data as stimulation in the process, it appears to provide information unreachable with conventional user research methods. How qualitative approach to eye tracking could be applied in product- and service development needs is of special interest to the writer of this paper.

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About the Author

Satu Hyökki is currently working with international issues as responsible project manager for international activities and supplementary education in Laurea Kerava. She has a BBA in human resource management and a MBA in business management, user-centered design, with special interest on eye tracking in user research.

In her master thesis Satu discussed the use of eye tracking data as a medium in user dialogue with the service designs perspective. During the past ten years in Laurea Satu Hyökki has undertaken development, management and implementation tasks in all areas of operations (R&D, pedagogy, regional development) both campus and regional unit level. She has always shown a great interest towards social media and virtual learning environments. Within the field of R&D she has been working in Development Manager, Project Manager and Assistant –positions gaining a wide experience and point of views on R&D activities. E-mail: Satu.Hyokki@Laurea.fi

LbD in Practice

LEARNING BY DEVELOPING – A PEDAGOGICAL INNOVATION BY LAUREA

Learning by Developing (LbD) means a development-based learning. It is a new way to obtain the competences required in working life. A student's learning is based on development work, research, people skills and producing new knowledge. In LbD, the student is considered as the junior colleague of the expert from the collaborating organization and of the educator. Students will complete the majority of their studies in working life relating projects. Many of these projects are multidisciplinary. The projects can combine, for example, aspects of the welfare and business sector. Laurea R&D Labs as learning environments constitute a special feature of the LbD-model.

The Finnish Higher Education Evaluation Council appointed Laurea in its entirety as a Centre of Excellence for 2010-2012 for student-centred R&D work integrated in learning. Laurea has been appointed as a centre of excellence five times, and is thus Finland's most awarded higher education institutions.

Project Learning Case: A Study of Organisational Communication in the KUUMA Member of Organizations

Kari Halme, Laurea University of Applied Sciences, Finland

Abstract

Project learning provides an effective and versatile mode of operation for business education. However, curricula in which the project learning runs from the beginning to the end of the studies are scarcely reported. This paper reports a project learning case that a group of Laurea University of Applied Sciences first year business students carried out as their first project. The description is in great detail to reveal the broad range of skills that can be acquired through project learning. For the students the learning outcomes have multitude facets. In addition to a plethora of technical skills, they have learned tremendously about teamwork, self-discipline, presentation, stress tolerance and critical thinking – in other words meta-skills. As the studies progress, the students will take even more responsibility in project management including conceptualization and partnership relationship management. In this case the project is an authentic assignment, therefore it strengthens the relationships between university and its' stakeholders.

Keywords

Peer-to-peer, partnership, organizational communication

Introduction

This text describes the very first project of Laurea University of Applied Sciences' first-year business students. This study on organizational communications in KUUMA municipalities was conducted by the students of Peer-to-Peer program. In Peer-to-Peer program the whole of curriculum content is learned in projects. The study at hand started on the very first day the students began their studies at the university.

KUUMA is a federation/alliance of two cities and four municipalities located in Central Uusimaa, the region surrounding Finland's capitol Helsinki. The aim of KUUMA alliance is to achieve cost reductions through joint purchasing, research and development processes. The total population of KUUMA member cities and municipalities was 171 645 inhabitants in the year 2009. (www.kuuma.fi)

This case description contains the study process as well as the evaluations of the outcomes of the project from the assigning party, students and course instructor. The communication managers of the city of Kerava, the city of Järvenpää and the municipality of Tuusula represented the KUUMA alliance as supervisors in the study on organizational communications. The research problems, data collection method and finalized questionnaire were defined collaboratively by the students, supervisors and instructor.

Forty students conducted the study on organizational communications January and November 2009. It needs to be underlined that this project was their first learning assignment and no preparatory courses preceded it.

In the end of year 2008 there were app. 7000 employees in the member entities of KUUMA alliance. Municipality of Nurmijärvi is the biggest organization in KUUMA employing 2400 people and municipality of Pornainen is the smallest employing 200 people. It is inevitable that organizations of this scale are characterized by several organizational levels and various relationships to stakeholders, which necessitates a structured organizational communications function. This kind of internal/domestic communication is elementary from the perspective of organizational effectiveness.

The objective of the study was to measure the performance of organizational communications from the perspective of workers as well as from the perspectives of the supervisors in each member organization of KUUMA alliance. Frequently used organizational communication channels and their reach was one of the key interests in the study. In addition, the attitudes towards organizational communication of both workers and supervisors were measured and compared. The decision making goal of the study was to provide direction for the development of organizational communications within KUUMA cities and municipalities.

The learning objectives of KUUMA organizational communications study were twofold. The first objective was to learn meta-skills like team work capabilities, information collection and self-management. The second objective was gain skills defined in the curriculum of business studies of Laurea University Applied Sciences.

Phases of the Project

The study on organizational communications in the member organizations of KUUMA alliance is described in the accordance with a general P2P project flow chart presented in P2P curriculum (2009,14). It should be noted that the research context is larger than just executing the project. The projects are building blocks for creating partnerships with assigners.

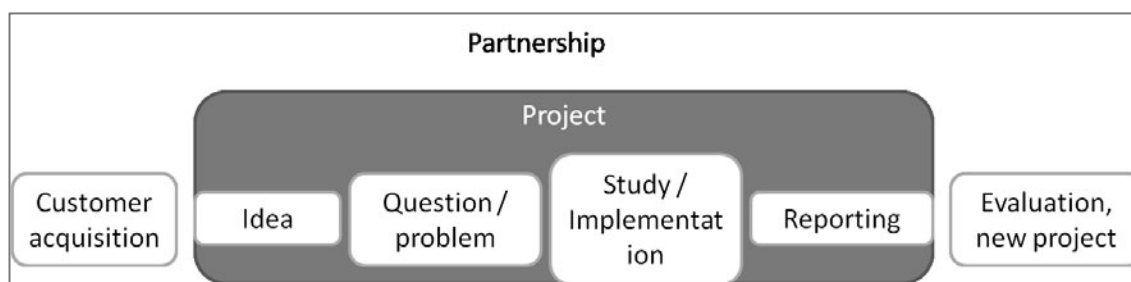


Chart 1 Partnership process in Peer-to-Peer

Customer acquisition is an essential phase of the process, because without assignments there would not be sufficiently challenging and current contents in the studies. Maintaining the partnership is important especially because customer acquisition requires so many resources. From motivational perspective if one keeps in mind that the eventual goal of a project is to retain partners, one naturally

strives to reach a quality level in project which satisfies the needs of the partner.

The following project description follows the process presented in Chart 1. The topics of the subchapters differ from the names of the phases as to characterize the iterative nature of the partnership process. For example, the idea generation phase might precede customer

acquisition, if one needs an idea present for desired customers/partners to gain their interest. Or the implementation might lead back redefining the research problem.

Partner acquisition

No P2P project emerges from a thin air they are responses to development needs stemming either from internal or external circumstances of an organization. The partnership process presented in this text is parallel to a customer relationship process in a business setting. Because this was the first project of beginning students the instructor was responsible for partner acquisition.

The scanning of potential partners precedes negotiations which search for the mutual benefits in a project and the creation of trust between the university and a partner. The negotiations for the organizational communications study between KUUMA alliance and Laurea University of Applied Sciences began in fall 2008. The KUUMA alliance had recognized communication as main organizational activity requiring development. In the early stages of negotiations the external brand of KUUMA alliance was considered as the topic of the study but it subsequently was decided that organizational communication needed study more urgently.

The research plan of the organizational communications study of the KUUMA alliance

A key task in partnership negotiations between the KUUMA alliance and Laurea was to create a feasible research plan for organizational communications study. The research plan was mainly created by collaboration between the supervisor from KUUMA alliance and the course instructor. In this phase the students contributed mainly in specifying and adding question in the questionnaire.

Measuring the functionality of organizational communications in KUUMA member organizations was established as the main objective of the study. The aim was to produce results which could be compared between the KUUMA member organizations as well as between staff and

supervisors. The assigners looked also for ideas to develop organizational communications. An additional aim of the study was to rank the importance and success of the different elements of communications.

The questionnaire for workers differed from those of the supervisors. Main research questions directed toward supervisors were as follows: How important is communication in your work? What channels do you use when communicating with you subordinates? What are the technical communications competencies of the supervisors? What are the supervisory skills needed to produce communication content? Does the background of a supervisor influence the way he/she communicates?

In the questionnaire directed toward the workers the main research questions were as follows: What channels do you use for searching information? Which communication channels are most important? Which communication content is the most important? How are messages presented from your perspective? The questionnaires were constructed so that it was possible to carry out a gap analysis on the importance and success of different elements of communications in KUUMA member organizations.

Quantitative survey was chosen for the data collection method since the aim was to gain comparable results which could also be generalized. Since all the potential respondents were easy to reach, no sampling was applied. The questionnaires were delivered to all employees of KUUMA member organizations either by mail or e-mail.

To ensure the comparability of the results means, medians and modes were calculated based on responses. The statistically significant differences of these key figures were tested using normal distribution and Student's t-test.

Data collection

Because this project was conducted by students just beginning their 3½ year studies, many of their challenges dealt with meta-competencies. The following kinds of representative questions were presented to the instructor: How should we

organize our team? Where can I find relevant information? How should we report our findings? Hence, the research problem wasn't necessarily in the focus of action.

Organizational communications is closely linked to leading and managing an organization, but this link is abstract and it is very challenging for a beginning business student to uncover. Therefore, the students were instructed to gather information on functions of an organization from a wide perspective. The relevant questions at this phase were as follows: What is organization? Why do organizations exist? What is management and communication? What are the employer characteristics of municipality?

Based on the reference material each four-member team wrote a report dealing with the above mentioned questions. Reports of the teams were presented two months after the initiation of the project. The findings of these reports partially defined questions later included in the study questionnaire.

This first phase of the project covered competencies normally included in courses the operational environment of a company and business processes (Laurea-ammattikorkeakoulu liiketalouden koulutusohjelma 2008). Essential skills acquired at this phase were information management and written and oral reporting.

The research problem: "Performance of Organizational Communications in KUUMA member organizations" was defined in collaboration with the assigners. The questionnaire consisted of the following study areas: communication channels, contents, timeliness of communications and needs for development.

To create a questionnaire the students had to gather information on different scales and types of research questions. The structure of the questions,

clear perspective and unambiguous nature were found to be critical for receiving valid replies.

The students created two different questionnaires, one for the employees of the KUUMA member organizations and one for the supervisors. Two questionnaires for each of the six member organizations were created. The questionnaires were created in close collaboration with the assigners and a 30 participants pretest was conducted.

Since the main media for data collection was an online e-questionnaire software program, it had to be learned in order to carry out the task. The data was collected during May 9th and June 16th 2009. 1432 employees and 269 supervisors responded to the questionnaire.

Data analysis and reporting

A questionnaire for each KUUMA member organization was created by using E-questionnaire software, thus totaling twelve questionnaires which accordingly produced twelve data matrixes. The data matrixes were adjusted to fit both Excel and SPSS software-suites. SPSS was used for the coding of variables and running of analyses. Excel was applied for creating graphs on multiple variables. For reporting needs variables were combined and modified by using either software-suite.

A report was written for each of the KUUMA member organizations. Every variable was analyzed by frequency and an applicable key figure was calculated (mode, median or average). Differences between employees and supervisors in communication channels and opinions were detected by using gap analysis. The chart below is an example of this result of the study.

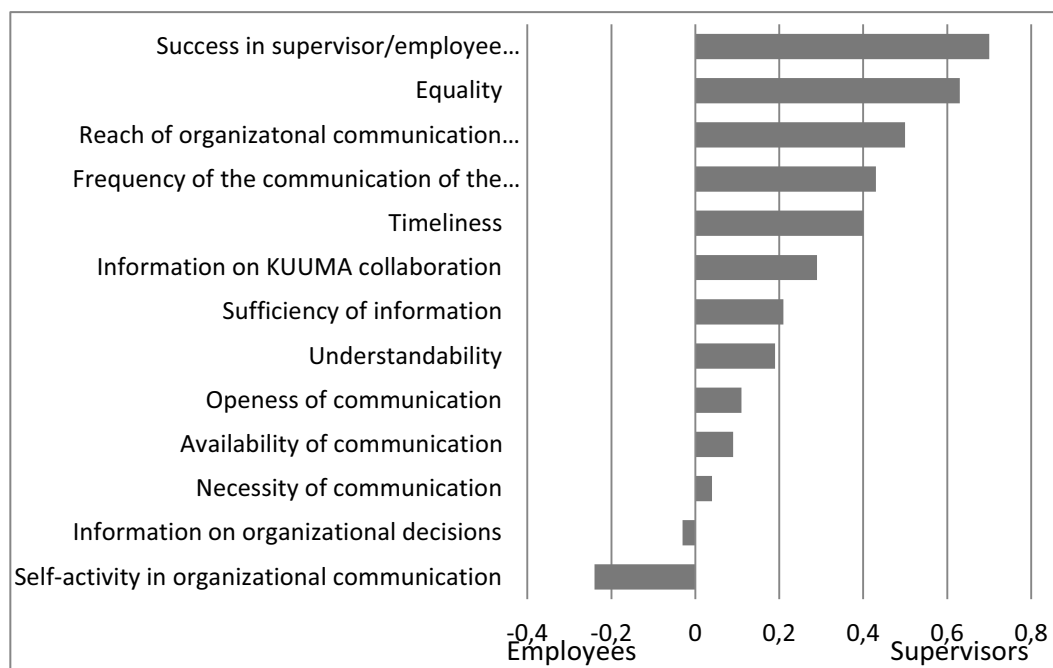


Chart 2 Example of research results: The gap between employees' and supervisors' opinions on organizational communication

Based on Chart 2 supervisors gave higher grades for most of the communication components. The differences of means over 0,2 were statistically significant on 95% confidence level.

This method of gap analysis required the students to learn quantitative question techniques in great depth. The students had to learn applicable question forms and scales for gap analysis presented above. In addition, they had to learn about the principles of testing statistical significance.

A report was written for each six KUUMA member organization. The students had to get acquainted with SPSS and Excel software programs to produce charts needed for the reports as well as the word processing software MSWord. In addition to technical skills they had to learn how to create communicative charts. The official reporting instructions of Laurea University of Applied Sciences were followed in study reports.

In analyzing the results and drawing the conclusions each student team collaborated with a liaison officer from their designated KUUMA member organization. This type of work led students to learn about communication challenges in real-life setting.

To support the report each team designed a PowerPoint presentation. Both the results of the specific organization and the comparative results of the entire sample were presented for the staff responsible for organizational communication in KUUMA member organizations. At this phase students learned how to prepare themselves for a professional presentation, how to present, argue and convince in a challenging presentation situation. In addition to these activities students wrote a newsletter for media about the results.

Evaluation of the project

As described in Chart 1 in an ideal case, evaluation is not the end of the relationship but lays foundation for following projects. The skills and experiences acquired in this first project enables students to "sell" and conduct more challenging projects as their studies proceed. The progression described previously in text strengthens meta-skills as well as technical skills. Naturally, the completed projects serve as references when negotiating the follow-on projects.

Self-evidently, partners which assign a project to Laurea's Peer-to-Peer program assess whether the objective are met. This of contributes a great deal to continuity of the relationship. Moreover, if the

study results are perceived reliable and worthwhile, it improves the chances of maintaining the partnership. Not only are reliable study results valued by the assigning parties but also the ease of collaboration during the study process is also valued. During the study process students acquired knowledge about organizational processes and stakeholders and information management skills.

Open feedback was gathered from the students participating in organizational communication study of KUUMA members. The feedback contains references to the learning of technical skills and meta skills i.e. teamwork and information management skills. Most references were related to technical skills which was expected because the implementation of the project required learning so many different software programs. Also the learning of analysis skills recurred in comments.

We have learned how to use SPSS...

We got a lot of training in how pose the right questions to reveal needed information,

... to analyze results and create a report based on these analyzes.

Drawing conclusions was hard because the differences were so small.

... collaboration with other teams.

We learned to double-check before we advanced.

Our ability to tolerate stress and to work under pressure improved

In the open feedback students also expressed satisfaction and joy over a completed burden. The last comment reflects the ability to evaluate the usefulness of this project. The comments below suggest implementing even more challenging projects and deepening the skills acquired in this project.

When we got our hands on the finalized study report it was a genuine triumph.

Interesting project. Final thesis will be an easy bite after this.

The study of organizational communication was appointed by the communication committee of the KUUMA alliance. The objective was to compare the effectiveness of organizational communication between KUUMA members and to diffuse best practices among them. The cost of the assignment was significant and its' meaning is characterized in the following feedback.

It is important to measure communication to get proven results to be able to direct the development activities of organizational communications towards right goals.

Since the study of organizational communication of KUUMA member organizations was the first quantitative study for supervising personnel, it was also an opportunity to learn for them.

The formulation of the preliminary study plan and the construction of the questionnaire were truly challenging tasks.

On the whole, it was encouraging that the finalized study met the expectations of the assigning organization. Even first year students can implement challenging projects.

First year students succeeded in a challenging project surprisingly well.

Referring to Chart 1, a project is actually a component of a partnership process. Therefore, from the perspective of Laurea University of Applied Sciences the final criterion measuring the success of a particular project is how many new assignments and how challenging projects the partnership generates. In this respect the study on organizational communication of KUUMA member organizations was at least reasonably successful.

According to our experience the study on organizational communication was affirmative and the survey will probably be replicated.

This last comment poses a challenge for the students: how to deepen one's knowledge and skills since there will evidently be a certain number of repeated questions. An option in this situation is to deepen the learning in partnership management; otherwise the learning opportunities are somewhat more restricted than in the initial study.

In this project the instructor faced a new kind of teaching situation. In addition to the demand to master the substance related to the topic he had to lead the project so that students seized the opportunities to learn. In the beginning of the project the challenges were contradictory. Firstly, the instructor had to deal with the students' expectations on teaching without falling into trap of starting to teach himself. The instructor had to help the students to process these expectations and support them to transform from the roles of students to the roles of experts. Secondly, the instructor was compelled to assist student in basic tasks such as sharing the documents, organizing team meetings, preparing for presentations and so on.

From instructors perspective one of the most remarkable learning outcomes was the improvement of teamwork skills and self-sufficient attitudes. Consequently, this student group became so proficient that the standard of subsequent projects rose significantly. During the study process the need for instruction decreased gradually towards the end. The completion of the study on organizational communication of KUUMA member organizations was a meaningful experience for both the students and the instructor because there were so many respondents and so many different perspectives were explored.

Conclusions and Development Implications

Table 1. lists the primary technical skill that students learned in the study on organizational communications of KUUMA member organizations. The skills listed are based on the perceptions of both the students and the instructor. Even though a skill has been listed as learned, one must recognize that it has only been learned in a relatively rudimentary fashion.

In the Peer-to-Peer program the idea of the curriculum has focused on few elementary business skills and to train these skills repeatedly. As mentioned the table includes mainly technical skills, but one must recognize that the project has required much wider range of skills. For example, preparing an effective report demands other skills than just the ability to operate MSWord software program. In this phase of studies it was only natural that there was a great deal of emphasis was placed on learning word processing, since many of the students were totally unaccustomed to it. The assimilation of report preparing skills was a necessity from the perspective of project implementation; hence it has been listed as technical skill in Table 1. The table portrays well the variety of learning that is achievable through projects.

Task	Skill
Theory formulation	Information search
The division of tasks	Teamwork skills
Questionnaire formulation and interpretation of study results	Quantitative statistics
Data collection	E-questionnaire web application
Coding of data, creation of tables and charts	SPSS software program
Creation of tables and charts	Excel software program
Preparation of the study report	MSWord word processing software
Presentation of study results	PowerPoint software program
Crafting of development initiatives based on study results	Basic tools for organizational development

Table 1 The tasks carried out in the study process and the primary skills learned while accomplishing the tasks

When students are implementing projects assigned to them by various organizations, the skills required could vary greatly of those defined in curriculum. It must be recognized that current curricula are organized based on scientific domains but real-life business problems extend over the boundaries of these domain. In addition, the planned order of studies may differ significantly from faced in project assignments. In conclusion, the authenticity of projects challenges both the structure and contents of traditional business studies curriculum.

Despite the above mentioned critical remarks the study of organizational communication of the KUUMA member organizations was a success. The project reached its' goals, the students had diverse and positive learning experiences and the instructor strengthened his counseling skills. The

implementation of this project improved the relationship between Laurea University of Applied Sciences and the KUUMA alliance.

Based on this project the participation of the students in the initiation and conceptualizing of a project must be further developed. Even though the actual implementation of the study has been challenging and educating, it should be understood that the before mentioned phases of the project make up an essential proportion of a business professional's competence. Ideally, in forthcoming projects the instructor will be able to focus on directing and students will be more responsible in conceptualizing a project and in partner relationship management.

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Get a Life Project – Tools for the User Driven Design and Testing of an Online Tool and Guidance Model

Olli Vilkki, Laurea University of Applied Sciences

Abstract

The purpose of the ongoing Get a Life project is to develop a future oriented web tool and guidance model for students and counsellors of institutes of higher education. The role of the HAMK University of Applied Sciences and Laurea University of Applied Sciences was user and usability study, and the implementation of the online tool.

The research and development of the tool is challenging, because the same tool must be adaptable to two use situations: counselling and student's self-counselling. We obtain good experience of chaining the use of the methods, and using extensive user networks in the evaluation of the use and usability of the tool. To verify the usability and user experience, we used user studies, focus groups, usability tests, expert evaluations, an automatic test player, automatic reporting, a reviser of the game database, and an automatic error report generator. The methods helped improve the stable use of the web tool, usability, and suitability for the intended use. Several of the methodical research approaches also produced many development ideas, which have not yet been used due to lack of time.

Keywords

Career Counselling, Simulation tool, Career-planning

Get a Life – Future-oriented Career Counselling for University Students

The project goal is to promote future-oriented thinking and pro-activity among university students. The students as well as the career counsellors in universities need tools for career planning in order to anticipate and assess the future directions of work life and society. This project provides a future-oriented simulation tool for the students as well as guidance tools for the

counselling personnel. The outcome of our studies will be practical knowledge of different kinds of tools and methods which provide a user driven design process. Outcomes of the projects:

1. long-term future scenarios on the development and changes in working life
2. an online simulation tool for students in the career-planning process
3. pedagogical model and a virtual handbook for career counsellors
4. the simulation is designed to complement the existing guidance material and tools

With the simulation tool the students can safely map and test future scenarios and create various future paths for themselves. The career counsellors will be able to utilize the simulation in their counselling sessions with the pedagogical model developed in this project. The simulation tool has built-in guiding elements and references so that the students can also use it independently.

The simulation tool is created and tested in close cooperation with a group of university students and teachers. In addition the project includes a comprehensive pilot phase on a large number of students and counselling personnel to ensure the utility and usability of the tool. The pilot phase is also an excellent opportunity to promote and disseminate the tool.

The simulation is built according to open source principles and can thus be modified and tailored to meet the needs of public and private organizations. Financing and Resources

The Get a Life –project has a budget of approx. 840 000 € between the years 2009 and 2011. The project is mainly funded by the European Social Fund (ESF). In addition, each business partner finances the project.

The project is carried out by five Finnish universities: Turku School of Economics / Finland Futures Research Centre (coordinator), University of Turku, HAMK University of Applied Sciences, Haaga-Helia University of Applied Sciences, Laurea University of Applied Sciences

Purpose of the Paper and the Viewpoint

The viewpoint of the paper is a practical reflection of user driven design, testing methods, and agile software development.

The following describe the problem setting of the paper:

1. What added value will user driven planning, its methods and tools bring to the development of the system?

2. What added value will automatic testing and a feedback system bring?
3. How networked user feedback and development support the counsellor's work and use of the counselling and simulation tool?

User-Driven Design and Iterative Development

User-driven design is an increasingly common model for the product and service design innovation process. The three basic principles of user driven design are (1) drawing attention to users and purposes right at the beginning of the design; (2) empirical usability measurement, and (3) iterative design (Gould et al. 1985). User-driven design is increasingly focusing on the observation of emotions and aesthetics alongside cognitive and functional factors. An issue revealed from user data that may seem simple, may turn out to be crucial to the use of the product. Acquiring data on end users is one of the key skills in product development. (Hyysalo 2006). User-driven design is an increasingly common model for the product and service design innovation process. The three basic principles of user driven design are (1) drawing attention to users and purposes right at the beginning of the design; (2) empirical usability measurement, and (3) iterative design (Gould et al. 1985; Wright, Wallace & McCarthy 2008). According to the international ISO 13407 standard, the user driven design process includes iterative phases when needed. ISO 13407 standard defines the user driven development process. Its iterative parts include understanding and defining the use context, definition of user requirements and organisational requirements, implementation and evaluation of design solutions. Ensuring the stable and error-free use of a program is an important part of usability.

The starting point of the simulation tool design was understanding how the users act and need guidance, and the purpose of the tool. The user and usability aspect was kept in mind throughout the design and implementation process. In designing the user experience of the guidance tool, the different uses of the tool had to be taken into account. A counsellor uses the tool continuously, and

the user experience of the tool develops during a long-time use. A student who uses the tool only a few times gets an immediate user experience. The expectations of a student and a counsellor of the use and user experience of the tool are not congruent with each other. In the early phases of the design process, the starting point was the needs of a student, and as the guidance model developed, the guidance process became more important. Traditionally, game-like products have been produced by a tightly-knit team in one physical location.

In the Get a Life project the content makers are scattered around Southern Finland, with team members meeting on average less often than once per month. The online feedback of future users and customers, user studies, expert meetings, and planning meetings guided the result of the design. At the end of each round, the state of the software development was assessed, and the activities of the following iteration were planned.

Simulation Tool for Career Counselling

The essential outcome of the Get a Life project is a simulation tool for career counselling. The Get a Life website and simulation are done using a web-based interface. Each project member has a staff user account, which allows them to create, modify, delete and browse content using a web browser. Each action is logged, so anybody can see who did what and when.

All the simulation content is stored in a relational database. The bulk of the simulation content is on cards. Each card belongs to a deck, and decks are organized into deck groups. Each card describes a situation in life and has two or more choices (usually 3 - 5 choices). Each card can be conditional. In other words, if the condition is met, the card is played. If the condition is false, the card can jump to another card, which might have a condition as

well. Each choice can lead to a new card or to a group of decks. If the choice leads to a group of decks, the simulation selects a random deck from the group. The simulation tries to use a deck of cards, which hasn't been played yet to avoid repetitive situations during the same simulation run. Each choice can have a condition, so the outcome of a user's selection can depend on any of the game variables e.g. past work experience, duration of current career, family and relationship status, ability scores and these can be combined by pure random chance. The player's choices affect the ability scores.

We've used Django's admin interface for the bulk of editing tasks. Admin interface

Dynamic Counselling Model for University Students

The dynamic counselling model is an entity supporting the selection in the Get a Life simulation. It comprises different counselling views. The model is targeted for counsellors and teachers. Students can use the model independently. The objective of the model is to help students predict the future and be able to influence the future solutions. The starting point of the model is that there are several dimensions in life, which are dependent on each other and they all together develop our competence and skills. The guidance will not necessarily produce the right solutions. The model of dynamic career counselling emphasises the significance of learning, development, doing, reflection of challenges, and planning in career planning. For practical career counselling situations the simulation tool contains a virtual handbook for career counsellors. The handbook is directed at counsellors, but also for those students who want to better understand the future career requirements (Römer-Paakkanen & Takanen-Körichrpe 2010).

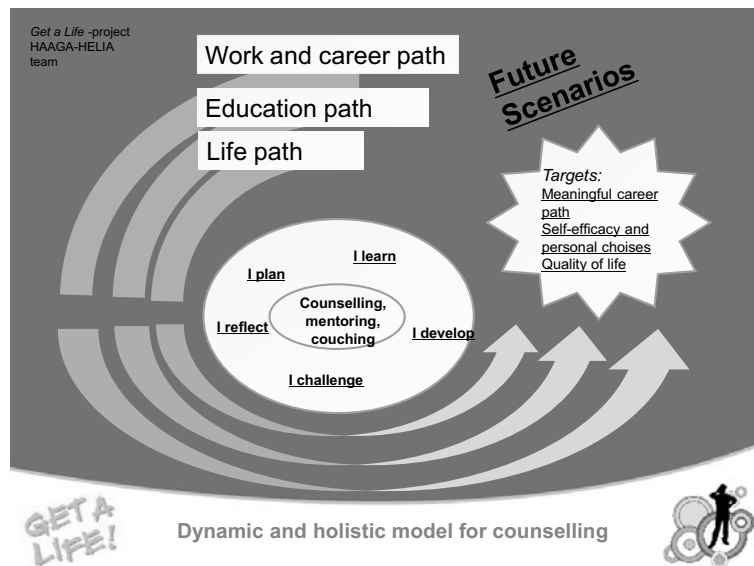


Figure 1 Dynamic and holistic model for counselling (Römer-Paakkanen & Takanen-Körichrpe)

User Studies and Handling of the Results with the Subjects

The objective of the user studies was to produce information about the users for the planning of the career counselling tools. They helped chart the user wishes about the features, functions, visuality and elements. The starting point of the planning work was the user studies done during the summer and autumn 2009. The studies consisted of competitor and product comparison, electronic form survey, and material of the focus groups to be analysed. They were carried out by the Laurea University of Applied Sciences and HAMK University of Applied Sciences in joint co-operation. The user studies provided information about the need of university students for career counselling, their wishes, and ways of obtaining information to support career planning. The studies were carried out at universities in different parts of southern Finland.

University students from the project's collaboration schools were selected into the user groups. The studies were started by charting the user groups, which made it easier to target the studies. The aim was to get an inclusive representation of the future simulation tool users into the groups. Students of different subject areas were selected: those starting their studies, as well as those close to graduation. A form based survey was made for counsellors. For the studies to be successful, it was important to identify the real user group. Finding the most

important user groups helped focus on the important topics for product or service development.

The user studies were started with competitor and product comparison. This helped chart different online services with similar operational logic, appearance, and functionalities. Product and competitor analysis is an efficient way to develop services. (Baxter & Courage 2005) Product and competitor analysis provides information about the market situation, technologies, and similar top services. The comparison helps evaluate why a product or service is sold or used. Based on the information, a product or service can be designed to meet the users' needs. (Saffer 2010, 60.) Of competing products and services, it is possible to identify general characteristics or working details which affect a good user experience, and can be used in the development of a product or a service (Hyysalo 2006, 46). In the modelling of the simulation tool, we used competitor and product analyses which clarified what kind of career counselling support the users already have, and for what kind of problems related to career counselling the existing services do not solve. The studies were carried out through an electronic form based query, and focus group interviews.

The user group study started with an electronic form based survey. The survey sought general information about the user groups' experiences and wishes related to career counselling. The formed

based survey also served as a recruitment channel for focus group activity. University students from different parts of southern Finland were invited to the focus groups. The participants were selected so that students of different areas, from universities of applied sciences as well as from universities participated in focus groups as comprehensively as possible. In all, five focus group events were organised.

The material from the competitor and product comparison and surveys was handled in the focus groups. Focus group activity is a research method refined from focus group interviews. It combines the structure of interviews and the tasks and activities of functional research. It helps quickly produce ideas, users' opinions and impressions of a product or a concept (Baxter & Courage 2005). Focus groups help find out the users' needs, conceptions, preferences, individual reactions, and ideas about the functionalities of products and services (Hyysalo 2006, 215; Parviainen 2005). In focus groups, it is also possible to carry out functional tasks, where participants get to ideate and voice their own opinions.

The focus groups progressed as planned. The participants were well acquainted with the subject, and had perhaps unconsciously processed it, because they all had answered the form based survey about career counselling. The results of competitor/product analysis were used in the focus groups by showing the participants picture samples taken of the competing services. The pictures were used to help support the discussion about career counselling and inspire new ideas amongst the participants. Screenshots taken of online services helped to outline the structure and visual look of the new user interface. The visual material also served as a medium for boosting discussion and dialogue (Pink 2001). The study produced information about university students' hopes and needs for career counselling, use of the Internet, and contexts of use. After the focus groups, the results were unravelled, and user profiles and user stories were created based on them. User profiles form a method for summarising the characteristics of similar users. A use scenario helps describe a future use situation (Sinkkonen & al. 2006). Research methods provided information about the users' hopes and needs. Charting the user groups did not cause any problems, because the future users of the service are all university students. The

impact of the field of study on the results was interesting. People studying to become nurses thought about things clearly differently than, for example, archaeology students. There were also differences between students of universities of applied sciences and university students.

We managed to involve the users in the design of the game concept and its user inter-face elements by combining the screenshots of competing services to the operation of the focus groups. When planning services or products, it is important to find a visual form which serves and attracts the user group. For users to adopt a product or a service, the whole package must work as they want it to.

For the studies to be successful, the leader's input must be high. To obtain just the right information from a user, the study must proceed as planned beforehand. The leader must avoid guiding and leading a participant. The leader must, however, be able to maintain a dialog.

Focus groups proved to be an effective method. They helped obtain a lot of useful information about future users' needs and hopes. The focus groups also provided ideas for the form and quality of future services. Combining competitor and product comparison to focus group activity advances the targeting and focusing of product and service development. In a functioning focus group, the participant can freely tell about their experiences. This provides an overview of the user group's needs and hopes. The best possible results are reached when users are involved in the analysis of competing products and services.

Usability Tests and User Studies of the Simulation Tool

During 2011, the aim is to continue studying the usability and use of the simulation tool. Both career counsellors and university students will be used as test users. The studies will be carried out through observation, thinking aloud, and theme group interviews, as well as in usability laboratories and in a real use environment. The material collected in the studies will be used to help finalise the tool to match the end users' needs, and become an inspiring and useful tool, which can be taken into use at universities all over the world.

Methods supporting usability tests and user studies were tested in the latter half of 2010. The first object of the experiment was combining the usability lab test (Techsmith 2011) and an eye movement study (SMI 2011) into one session. The eye monitoring equipment is equipment suited for assessing usability. It follows the user's eye movement and records it into a video clip. The device can also be used to record a user's speech. It is also usable when there is a need to find out how a user observes the different parts of a user interface. A usability lab provides the means to record the use of a keyboard and a mouse, and thinking aloud. The equipment films both the screen and the user's face. An observer may set different signs and comments which will be recorded onto the same tape. Another object of experiment was the combination of tests and a group interview, where a user interface designer, an observer, and a user group discuss about the operation of the programme, user experience, and improvement ideas. When we used the theme interview template of user studies as the basis for the group theme interview, we gained experience on how the form worked as a medium of an interview.

Two test users, a research leader, and an observer participated in the study. The experiment was carried out in the Laurea Kerava site usability laboratory. The task of the research leader was to introduce the use of the career counselling tools, and provide tasks to the test user. At first, the test user was instructed in the use of the career counselling tool. Since the purpose of the study was also to find out about the suitability of the Get a Live career counselling tool for the career counselling needs of university students, the test users were provided with user stories at the beginning of the study (Sinkkonen 2006), which made it easier for the users to understand the reason for using a career counselling tool. During the use of the career counselling tool, they were asked to think aloud. The situation was recorded with the equipment of both the eye movement monitoring and usability laboratory. The observer made notes about the use situation. The observer observed the user during the research situation, made notes and collected information through a theme group interview.

After the usability test, a group interview was organised, for which we created a question and check list. We used it to go through the usability

test and feelings after the use. The questions are based on Nilsen's (2000) heuristic list. With the questions and the group theme interview, we aimed to clarify (1) Use and ease of learning it; (2) Intelligibility: was the language used in the game easy to understand; (3) Memorability; (4) Consistency; (5) Coherence and compliance with standards; (6) Clear and free mobility; (7) User experience; (8) Visual look and aesthetic character; (9) Pleasantness of graphics and visual look and feel; (10) Realisation of career counselling objectives. Test users also evaluated in later studies the sensibility of the questioning used in the studies. Based on the test, we evaluated the usability of the questions, and if we can collect information about the use of career counselling tools through them. Based on the above, we created a survey form for future user studies.

It proved useful to organise a test round before the actual user tests. The use of several methods and a group interview worked as expected, and provided information about the interaction of the Get a Live simulation tool and users, and about the use of different methods in the study of the use of a tool and usability. The eye movement monitoring equipment helped clarify how the different elements of the user interface were located, and what attracted the user's attention, and whether the texts were placed so that it was easy for the user to concentrate on the essentials.

Get a Life is still far from being finished and we have had about 350 test users. We have received roughly an equal amount of feedback from users.

Even though this was an experiment, and planning for a future user and use study, in addition to method development, the research situation provided user information for the development of the simulation tool. Giving each test users a different user story helps gain versatile information about different use situations.

Testing and Feedback Tools

Error-free, stable, and undisturbed operation of a system is a prerequisite for good usability. The most important results of the project are related to the elimination of these characteristics. At the HAMK University of Applied Sciences, Senior

Lecturer Petri Kuittinen led an effort to develop different assisting testing and feedback tools, which helped improve the reliability of the career counselling tool. Such tools include (a) User Feedback and Error Reporting, which enables immediate feedback in a use situation; (b) An automatic test player, which tirelessly kept going over the entire game structure; (c) Game Database Check, which goes through the logical structure of the database content; (d) Game Deck Path View, which visualises the database content; (e) Picture Usage Statistics, which compiles statistics on the use of graphics; (f) Content Text Dump, which helps format and proofread the content, and; (g) Automated Error Report Generator, which looks for faulty operations during a simulation.

User Feedback and Error Reporting

Most existing games don't provide the user with any inbuilt tools to report errors or give feedback, or suggestions on how to improve the user experience. Usually the user needs to go to a separate web address and fill in complicated registration forms and spend a lot of time on simple feedback. The Get a Life simulation has "send feedback or report an error" on each page and the same link can also be found on the home page of the website.

Giving feedback is very easy. As the user is already signed in, he/she just needs to select the type of feedback and there's a free form text box. The feedback can be viewed, sorted, and filtered using the admin tools. Each feedback automatically contains the sender, date and time of submission, and the situation in the simulation. For example, if the user finds a spelling mistake or lack of content in the game, the feedback system automatically logs in what the user's situation (card) was at that moment, so the developers can easily spot where the mistake was. The creative output from users has been very beneficial to the project.

Automatic Test Player

The automatic test player plays the simulation using randomly selected background scenarios, randomly selected ability scores, and by taking random choices. Then it prints out the complete simulation run in chronological order, including the

inner game variables and ability to filter out the results based on the type of cards. Each card and choice has quick links to edit as usual.

Even though a purely random test player sounds simplistic and silly, this tool proved to be invaluable in finding mistakes in the simulation game engine, as well as in finding problems in the simulation content. Interestingly, it made some choices very few humans would ever make. Human work is expensive, but with the automatic test player one can quickly do several complete simulation runs in a minute. The automatic test player helped to make the code more stable and reduce the number of simulation crashing and displaying error messages to the user.

Game Database Check

The game database check checks the content of the entire simulation. It analyses each deck group, each deck, card and choice checking them against 35 different rules. It produces an error report detailing each error or warning, each of which has quick links to edit them. Some errors like invalid condition are detected and forbidden by the admin interface, but they are still validated by the check tool just in case. The tool can find complex errors, like loops or possible choice paths which advance in time too quickly. It gives warnings about obvious mistakes, like if a card doesn't have a picture defined or the textual description is overly long. It can also find copy and pasted content duplicates. The tool also finds unreachable cards, basically orphan content, which is never reached in the simulation, and thus irrelevant.

Game Deck Path View

The relations between each card and the deck group can be difficult to understand, so a tool was created which makes a visual view out of it. Each card is represented by a rectangle, which contains an abbreviated version of its content with arrows pointing where the choices or card based condition branch can lead to.

Picture Usage Statistics

Originally the simulation had roughly only 60 pictures and soon the number of cards rose to higher than 600. Obviously some images were then used by many cards. The picture statistic tool simply lists each image of the simulation, stating how many times it has been used and what cards are using it. There are quick links to edit the cards. This allows the graphic designers to quickly see what kind of picture content is used too of-ten.

Simulation Content Text Dump

The simulation content text dump tool prints out the entire textual content of the simulation as one huge web page. It is handy for translators, but it also proved to be invaluable when trying to unify the amount of terms used e.g. at one point we wanted to replace all the words like cousin, uncle, aunt etc. with the word "relative". One could just search the terms and then replace them. Another useful use of this tool is the spell check. One can just copy and paste the text to a word processor and do the spell check.

Automated Error Report Generator

The simulation itself contains several safe guards against corrupted or totally illogical content. The simulation tries to fall back into some sort of sensible flow of plot even in cases when the content is broken. Detecting some types of loops (the same cards get repeated over and over again) would require a huge amount of processing power due to the conditional nature of links between the cards and deck groups. The simulation will detect these and many other things automatically, break the loop, and automatically write an error report.

Summary

Focus groups proved to be an effective method. They helped obtain a lot of useful information about future users' needs and hopes. The focus groups also provided ideas for the form and quality of future services. Combining competitor and product comparison to focus group activity advances the targeting and focusing of product and

service development. In a functioning focus group, the participant can freely tell about their experiences. This provides an overview of the user group's needs and hopes. The best possible results are reached when users are involved in the analysis of competing products and services.

User stories, thinking aloud, and the use of eye movement monitoring with a usability laboratory is a functioning concept. The use of a group interview or a focus group after a usability study enables the handling of user experience and different improvement ideas. The combination of the methods deepens the user information, when the user's actions are examined in several ways.

Traditionally software only has unit tests, which provide a static way to test the application programming interface of the code. Unit tests are not good at detecting complex errors. The number of states and inner variables inside a game can be astronomical, and it is simply not possible to write a set of tests, which have any decent coverage over the different cases.

The automatic game database check tool proved to be truly invaluable. During the simulation content creation it has found hundreds upon hundreds of errors and even more warnings. Fixing the mistakes has usually been very fast, sometimes taking just a fraction of a second per mistake.

Traditionally, it has been cumbersome to write error reports or send feedback to the developers, or feedback has been too vague to be useful. In the Get a Life project almost all the feedback has been useful. Experiences from the project, even though it is still at the very early stages, show that the amount of work put to the feedback, automatic test player, and game content verification tools has been highly useful. Almost any software project would benefit from the methods described in this text. Even a purely random automated test user can detect many errors and potential problems in software.

The user centricity of the project is also demonstrated by the fact that user study methods, like group interviews and focus groups, were used in the development of the career counselling model.

The next phase in the development of career counselling is to investigate the longer term use of

the tool, and based on that, improve the development of counselling work and simulation, as well as the counselling model.

Initiating a comprehensive networked multi-working method and the project work was difficult at first. The planning meetings held almost monthly

boosted the work. The common work was furthered by the concreteness and functionality of the simulation tool. The work turned from abstract to concrete. Inspiring project management is also important in guiding the work of a multidisciplinary work group.

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Executive summaries and implications for managers and executives

Training and Retaining Effective Safe Motherhood Advocates

Susan Watt & Jean Chamberlain

Introduction

Since 2005 Uganda has been the testing ground of a different approach to addressing safe motherhood. Rather than relying on health care professionals to duplicate the maternity care of developed countries, Save the Mothers has developed an educational program to provide public health leadership to address the underlying issues which endanger the lives of women and their infants. This paper examines some of the outcomes of this program in relation to recruiting, training, and retaining a cadre of safe motherhood advocates.

Main Principles

The results of this program have been to create a networked core group of East African public health leadership expertise in safe motherhood. The program has demonstrated significant specialized learning about factors which promote or endanger safe motherhood in developing countries and in East Africa in particular. 50% of graduates claim an increase in job status since beginning the program and 100% claim to continue to work in their own field on issues of safe motherhood. Graduates of the program are being recruited by all sectors for advice, expertise, and leadership to enhance Uganda's capacity to provide better maternal and infant care.

Key Implications

This program is the first of its kind with the potential to be replicated in other high-need countries with major challenges to achieving safe motherhood, or to function as a training center for all of East Africa. There is a potential to collaborate with other East African universities and international institutions.

Holistic Innovation: Quintessential Boost to Food and Beverage Business Investments in Nigeria

Prince Umor C. Agundu , Bariyima D. Kiabel , and Cletus O. Amah

Introduction

There is growing need for business organizations in Nigeria's well-endowed economy to accentuate new ideas and processes, which would impact significantly on general attitudes and projected financial altitudes. Against this backdrop, strategic holistic innovation (SHI) necessarily sensitizes corporate executives and operatives to not only accept radical systemic change but also function efficiently in the context of the challenge to drive higher business investment performance. In the Nigerian environment, this study has abundantly established that through the instrumentality of SHI. With it, the firms in the food and beverage sector would also brace up and be counted among the innovation-friendly, innovation-compliant and investment-efficient. They should, therefore, demonstrate greater poise to perform or perish. This is the corporate advocacy of all time and SHI is the key. (SHI, strategic holistic innovation)

The path to successful strategic holistic innovation (SHI) and organizational renewal is in the not-too-comfortable terrain of breaking down traditional bureaucratic structures for which most business organizations are known. Firms are required to transform to e-organization which represents a seven-dimensional model of the centerless enterprise. The other six dimensions, besides flat organizational structure, are leadership, people and culture, coherence, knowledge, alliance and governance. Each of these dimensions when strategically applied in an appropriate dose encourages out-of-the-box thinking and behaviours that promote the organization and remove the strategic business units (SBUs) from a lock-step system of policy and measurement. The actors then properly apply their imagination, knowledge and common sense in pursuit of new opportunities, advancing the enterprise towards centerless corporation.

Business organizations which are free of traditional bureaucratic structures are better placed to achieve innovation and improved organizational performance.

Systematically, innovation is stimulated in adhocracies by personnel (who are sound professionals), lack of formalization, and active involvement of lower-level employees in decision making. Nonetheless, the key to innovation in the simple structure lies not in the structure itself but in the chief executive officer (CEO). The personality, power and knowledge of the CEO differentiate those simple structures that innovate from those that do not or fail.

Nigeria's Food and Beverage Industry in Perspective

Nigeria's food and beverage industry is increasingly attracting more local and foreign investors in recent times. Accordingly, food is fast becoming Nigeria's top business. The growing vibrancy of this industry is largely sustained by the productive agricultural sector which provides the industry with cheap and reliable raw materials driven by the huge available local market.

Food processing business is estimated to grow at 6-12 percent, on an estimated GDP growth rate of 5-10 percent in five years.

Key Implications

For an embattled sector like Nigeria's food and beverage industry, this study could not be more significant. Managers in this industry will find it particularly useful, especially for the normative guide it proffers them to appreciate the intricacies of SHI in the Nigerian context and apply same in their day-to-day policy decisions. Fundamentally, it calls for an upward review and prioritization of the pattern of emphasis placed on the administrative innovation domain.

Behaviour of Internet Banking Adopters: An Examination of the Psychological and User's Readiness Determinants

Ali H.S. Zolait & Minna Mattila

Introduction

Research attempted to examine the behaviour of potential adopters of Internet Banking (IB) in regards to their preferences, IB services, and uses of related technologies, IB promptness and banking difficulties among potential and actual adopters. Research self-administered 1000 questionnaires to obtain convenience sample of 369 responses from IB and non IB users at 17 banks operate in Yemen.

Internet banking is a new channel for delivering services to customers, and is growing rapidly in overall the world. Customers use Internet banking services for example for accessing accounts, transfer of funds, buying financial products on-line, ordering cheque books, printing statements and checking transactions and paying bills.

Banks in developing countries such as Yemen have started thinking of a greater presence on the Web and they believe that using information systems, telecommunication and technologies, customers can reach out to the bank and get not only general information about its services but also the opportunity to perform interactive retail banking transactions. Online banking refers to several types of services through which bank customers can request information and carry out most retail banking services such as balance reporting, inter-account transfers, bill-payment, among others, via a telecommunications network without leaving their homes or organizations.

Channel service level is one of the critical factors affecting the customers' movement from old to new financial delivery channels. Personal selling has been found to lead in the best results when moving customers between channels but the power of advertisements shouldn't be overlooked either. Banks need to be also aware of different adopter categories opinions' towards improving efficiency. What is perceived to be efficient, personal service by others may not be the same for different customer segments. Also the pricing preferences are likely to differ according to different user groups. Therefore, it is of an utmost importance that the different adopter categories are to be approach appropriately through service delivery channels of their choice. According to Mattila late adopters find bank's name important, valued social contacts with the banking personnel, and short distance to a branch, majority and early adopters valued above all speed and freedom from time and place.

Key Implications

It seems that the customers could still lack the awareness, experience, exposure and knowledge to deal with these banking innovations. In terms of e-rail, evidence is drawn from this study's finding pertaining to e-rail usage and from similar findings of Ba-Alawi's (2004) study who claimed that the lack of e-rail use is due to the people's lack of awareness of the existence of this service in Yemen. The e-rail providers should make a greater effort to promote it to the public. In terms of IB, this study found that respondents with a low level of awareness, experience, knowledge, and exposure of IB are either rejecters or late adopters. Therefore, the low percentage of IB actual users could be due to the readiness factor addressed by this study. It is also indicated that users of PCs and the Internet are found to be IB adopters and that respondents who are not users of PCs and the Internet are also not actual users of IB. In terms of SMS banking, similar to IB respondents, those with low levels of awareness, experience, knowledge, and exposure to IB are either rejecters or late adopters. Forecasting the behaviour of all identified IB adopters categories prove that IB adopters behaviour still stronger in the informational level than in transactional.

Practical implications – The managerial implications of the study are that the banks in Yemen should work hard to improve IB services that mach perceptions of both adopter and non-adopters, mainly the rejecters who do not intend to use the service in the future. Banks should also find how to motivate each segment of adopters to have more experience in all IB transactional internet based services.

Transforming Inquiry and Action in Interdisciplinary Health Professions Education: A Blueprint for Action

Daniel J. Pesut

Introduction

Interdisciplinary collaboration is valued in health care; however, the practice of interdisciplinarity is a challenge in terms of education and training. Interdisciplinary care requires team work and relies on the individual as well as collective intelligences of the team members. This paper explores several questions. How does an integral perspective influence teaching, learning, and the professional development /socialization, of individuals and teams in health care contexts? From an integrally informed perspective, what are some of the essential concepts that might be developed to create transformational learning experiences among interdisciplinary health care providers? How do dialogic and generative dialogue leadership skills support reflection and state transitions in group dialogue contexts? What organizational steps and stages of development are necessary to evolve an integrally informed interdisciplinary health profession course or curricula?

There are parallels between individual and organizational action inquiry stages. At the organizational levels development proceeds from conception to investment, to incorporation to experiments to systematic productivity, to social network to collaborative inquiry to foundational communities of inquiry to liberating disciplines. Such a developmental trajectory provides a blueprint for future action (See Table 2). Action inquiry is the process of engagement and scientific study related to interpersonal interactions. Dialogic and generative dialogue leadership skills are essential ingredients to support interdisciplinary reflections and transformational learning.

If interdisciplinarity is a means of solving problems and answering questions that cannot be satisfactorily addressed by using single methods or approaches, then integral theory may be a way to advance the field of interdisciplinary inquiry. Integral theory is useful and provides direction for health professions educators who are invested in creating interdisciplinary models of practice, education and research. Through application of integral theory and attention to lines, levels, states, stages and types, educators can begin to create and develop learning experiences in service of transformational learning goals.

Eye Tracking in User Research

Satu Hyökki

Introduction

Eye tracking has been broadly used in cognitive sciences and the data is usually analyzed with quantitative methods. This paper gives insights into eye tracking in general, in its methodology and the specifics within it. The aim is to discuss the qualitative use of eye tracking in user research. This article describes how eye tracking data could play an important role in the user research when aiming at understanding the users and the user experience. Broader study is needed on utilizing eye tracking data in catalytic or reflective ways in interaction between the users, developers and researchers in product- and service development.

Eye tracking can bring added value to user research by providing us insights that would not be available with more conventional research methods. These insights are related especially to user's visual attention, for instance, in usability testing eye tracking can tell us where the user was looking at when making a decision.

From the system analysis point of view the nowadays existing eye tracking applications can be divided into two categories: interactive and diagnostic systems. Objective and quantitative evidence on user's visual and attentional processes can be provided by diagnostic use of the eye tracker. Diagnostic eye tracking involves recording eye movements over time in order to find out user's attentional patterns over a given stimulus. The stimulus does not usually need to react or change to the gaze. On interactive systems, user's gaze is interacting with the application, the eye tracker is serving as an input device. Areas of eye tracking: marketing, human computer interaction and perception of design.

This paper describes one pilot study conducted by the Laurea User Driven Innovation Centre, testing the use of eye tracking in real life context. The pilot study was conducted in the framework of library development. However, the main aim of the pilot was to test the how the visualised eye tracking data (gaze replay) could be used in the dialogue with the users. The method used in the study combines eye-tracking, think-aloud, interview and future workshop.

The visualised eye tracking data enhances the dialogue with the user. Gaze replays or other forms of visualisation of the eye tracking data such as gaze plots of the paper prototype usage, can provide new insights for the researchers. In an interview situation interviewees are usually restricted to memory capacity only. The visualisation of eye tracking data offers information which can enhance the dialogue among the users and developers.

Key Implications

In the pilot study of the library space, it was possible to gain useful information on the first impression of the library space by the gaze replay with the think-aloud data and the interviews. Conducting the post experiment interviews and watching the gaze replay videos together with the users were complementary to each other and verified the first findings done by the researcher herself when analysing the data.

Especially combined with other methodologies such as pre- and post experiment interviews, observation, think-aloud and retrospective think-aloud or workshops and other types of group activities with the eye tracking data as stimulation in the process, it appears to provide information unreachable with conventional user research methods. How qualitative approach to eye tracking could be applied in product- and service development needs is of special interest to the writer of this paper.

Presenting Laurea University of Applied Sciences

Laurea University of Applied Sciences (Laurea UAS) produces new competences in the field of service innovations and carries out professionally orientated education, regional development and R&D activities. Laurea employs approximately 500 staff and faculty members and has app. 8 000 students, of which app. 1 200 studying in the adult education programmes. Laurea operates in the Greater Helsinki Region on seven campuses.

The largest fields of study at the multidisciplinary Laurea are Social Sciences, Business and Administration, Social Services, and Health and Sports. Laurea's activities are based on the Learning by Developing model which brings together students, lecturers, working life representatives and experts of R&D activities in various cooperation projects.

The Finnish Higher Education Evaluation Council appointed Laurea's Learning Integrated Student-Centric Research and Development Work as a Centre of Excellence in Education for 2010-2012 in their meeting on Nov. 26th, 2009. Laurea's Centre of Excellence covers the operations of the entire University of Applied Sciences. Also, Laurea has been awarded the European Commission's Diploma Supplement Label for 2009 -2013. Laurea is audited by FINHEEC.

FUAS - Federation of Universities of Applied Sciences

Laurea, together with LUAS (Lahti University of Applied Sciences) and HAMK (HAMK University of Applied Sciences), is a founding member of FUAS, the largest strategic alliance of Universities of Applied Sciences in Finland. The educational profile of FUAS is focused on being an international pioneer in workplace-oriented pedagogical solutions integrated in the RDI activities.

The student body of this Federation of the Universities of Applied Sciences (FUAS) represents approximately 15 per cent of the Finnish UAS students. FUAS addresses global challenges by forming multidisciplinary RDI consortiums and high quality degree programmes that merge creatively FUAS' focus areas: ensuring welfare, technological competence and entrepreneurship, societal security and integrity, and environment and energy efficiency.

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