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Oysters and APEL - Destined to be a delicacy?
Evaluative Study of APEL Policy in Practice 2013

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Abstract: The paper uses social policy theory (SPT) in the context of a UK university (UKU) and RLtd to explore the nature of the APEL relationship. Surveys sent to students and other stakeholders along with the literary evidence provide data for this study. The paper argues that through the enactment and analysis of APEL, traditional approaches are highlighted, which show that APEL can lead to "taken for granted practices" in HE, and become embodied as urban myth, and that many aspects of APEL don't appear changed over time; However the paper also argues that the enactment of APEL policy in different contexts can extend the concept, engagement and understanding of the benefits, illuminating successful outcomes between the different parties involved, and gaining increased credibility for HE collaborative partnerships in the current environment in which Higher Education Institution's (HEI's) are now situated.
KeyWords: Higher Education; Accreditation; Policy Enactment.

1. Introduction

In 2001, APEL was considered "mainstream" in an important report by Merrifield et al (2000), which mapped APEL in English HE; however not much later a report by Garnett, et al (2004) found APEL became a marginal activity relevant to some professionally oriented courses, and universities differed considerably in their approach to and adoption of APEL. There is also evidence from a later regional study that some universities do not have an APEL route at all, e.g. in Stockton's (2008) study, it was found that only 26% of respondents had APEL /Accreditation of Experiential Learning (AEL) policy in Herefordshire and Worcestershire. Hence the reason for this study; although APEL as a policy exists in HEI's, it is now some time after Merrifield et al's (2000) report. The environmental backdrop has changed considerably in HE, and therefore the question posed is "How has APEL developed (if at all) to accommodate this changed environment in which it is operating?"

Becher and Trowler (2001 p2) report that these changes include, "globalization; "massification"; altered HE-state-industry relations; marketised relationships; managerialism within universities and, finally, substantive disciplinary growth". This shows a somewhat turbulent environment for Higher Education, coupled with what Bloland (1995) refers to as a "blurring of boundaries between HE and other education sectors" and indeed a key feature for some universities is the development of collaborative partnerships, hence the choice of the RLtd, the case study being evaluated in this study.

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It represents many elements of this new operating environment; the widening participation agenda, the marketised relationships, managerialism and HE-state-industry relations.

The other main reason for this study is that Trowler (1996 p8) found "there has been almost no attempt to substantiate or refute the claims through...study of the student experience of APEL or to identify how students respond to different ways of implementing the process."

This study attempts to contribute towards this objective, and portray this perspective. It is highlighted that the context of this study is very different to a traditional student context in HEI's; indeed Armsby et al (2006) suggest that 'work-based learning approaches' could offer solutions to the problems generated for APEL practitioners because they recognise general learning.

The key research objectives from the study are as follows:
1. To establish which aspects of APEL policy enactment have remained stable over time

2. To ascertain whether there are any new developments with APEL

3. To determine whether there may be wider potential for APEL policy in HEI's.

The next section reviews the main literature relevant to this area.

2. Literature Review

In many ways APEL can be compared to an oyster; it has been around for some time, but is not always popular with everyone; however for those who really appreciate oysters, they can be a taste to savour. Oysters have many and varied varieties, and this could be compared to the different varieties of prior accredited learning - APEL, Accredited Experiential Learning (AEL), Accredited Prior Learning, (APL), Accredited Prior Certificated Learning (APCL), variations on a theme some might say, and attractive to different people. Hence the reasoning behind the analogy: Is APEL destined to be only a delicacy for some, like the oyster, or does it have the potential to be a mainstream policy, and more widely adopted and used by students?

Garnett et al (2004) neatly summarise the APEL benefits from various papers and one key advantage of APEL is that it is seen as a flexible response recognising the learning achievements and future aspirations of claimants. This is further supported by Betts & Crichton (2009), who found that APEL can offer a lot more flexibility in time, place and pace of 'delivery' than the traditional module delivery. This is particularly pertinent now with modes of technology and transport infrastructure enabling people to travel and communicate much more easily. However in practice this is rarely discussed between the students and tutor in the case of APEL. However APEL facilitates the fact that it is open to all people with work experience and thus enables contribution to widening participation, and is supportive of the Government agenda. APEL has always offered these same flexibilities, but APEL does have its downsides, and Cox and Green (2001) noted it "is widely regarded as time consuming and difficult".

Even with environmental changes and the fact that APEL could offer opportunities for people returning to study and thereby address national social inclusion and widening participation agendas (Cox and Green 2001) there does not appear to be a co-ordinated HEI strategic initiative to use APEL and release its potential. The fear is that although the value in APEL seems to have been recognised for some time, e.g. (UCAS 1996) generally the numbers of students part-taking in the process seem small and the argument

was that the situation would likely continue to be this way unless changes were made both in policy and in HEI's. This prophecy does seem to have remained true. The complex environment as described as the marketised HE system characterised by de-regulation of the system, reduction in the monopolistic position of universities and a threat of new rivals, including private industry and information technology on a global scale, and the increased power of customers, students, employers and the government acting as a core buyer by Dill and Sporn, (1995) shows that it would seem that not only have the dynamics become more acute in these areas, but so has the agenda for APEL in 2013.

Stockton's findings (2008) revealed the how APEL was viewed in HEI's; 44% said there was insufficient knowledge of the accreditation process from tutors, and in addition 23% of students were advised to take the full module for convenience rather than APEL. Both these latter aspects of APEL seem firmly rooted in the culture of HEI's as taken for granted practice. Garnett et al (2004) conclude that APEL, though long established in the UK, is an under-used tool, yet it has great potential as a framework for providing retrospective credit, exemptions and 'advanced standing' into higher education programmes, and, crucially, as a developmental tool. APEL offers huge benefits to HEI's by opening up opportunities to use their assessment capability to better effect and to play a full part in workforce development at local, regional and national levels.

3. Research Methodology

The theoretical stance adopted in this paper is social practice theory (SPT), drawing on Bourdieu (2000) and Giddens (1986). SPT offers value by attempting to provide new insights on habitual practices: (Sibeon, 2007), so in this case, APEL policy and practice, and is often defined as a framework to describe how individuals in different societies both shape and are shaped by their environment and it attempts to articulate how identity and individual agency rely on and produce cultural forms.

The purpose of this study is to report on a qualitative pilot study of APEL policy to ascertain whether perceptions and practices have changed over time. In order to achieve this, the recent experiences of mature students, business practitioners, are explored to ascertain how students themselves feel about the APEL process. Leaders and policy-makers of APEL were also interviewed to gain an additional perspective in an attempt to gain an end-to-end view of the whole process, and then to discuss its applicability in a wider context in 2013. The pilot was based around the 2013 cohort of 20 mature students on the RLtd foundation degree, partly to represent the nature of the collaborative venture now supported by wider participation and new Government direction. Electronic questionnaires were dispatched to 20 APEL students who are serving Middle Managers typically in the age range 25 – 45, and responsible for the efficient running of a restaurant. This method was the most expedient to despatch and return to this widespread audience working in restaurants all over the UK, and the quickest way for ease of completion. The response rate was 80%. The questions for the survey were informed by reference to previous studies in this area so that direct comparisons can made (e.g. Stockton (2008), Betts & Crichton (2009)), and also to the wider literature. Questions arising from the interviews were also inserted into the questionnaire.

The strengths of using a case study lie in the depth that is possible when using a limited number of people thereby allowing focus on individual experiences, (Polit & Hungler 1989). This depth facilitates analysis of personal reflections, thoughts, intentions from the individual in their environment, which was

necessary when assessing the situation concerning APEL. Semi-structured interviews with 4 university officers, 2 policy makers, 8 Business School Heads of Department and Academics, and 4 leaders at FFC, along with the documentary evidence such as emails, and APEL policies provide additional data for this study to capture the discourse surrounding the policy enactment in practice.

4. Main Findings

The first research objective was to establish from the study which APEL policy practices seem to have stayed the same. There is evidence that themes around APEL are constant, e.g. APEL is seen as a good and valid thing to do, the benefits are sound, and the students found APEL a positive experience recognising their learning, and providing exemptions where they are merited. This can only improve the student experience.

Cox and Green (2001) also showed that APEL provision that provides support for individuals who are unfamiliar with HE is more costly, since more guidance and support is needed, and this is shown to be true in the case study. RLtd does provide dedicated support to the cohort and as one manager said "This is an investment for RLtd. We know that as our managers become more knowledgeable, and apply wider skills their restaurants and people and customers will benefit". The cost aspect is acknowledged, but it is managed. It also means though, that students require support for APEL to be successful, and RLtd have set up a rigorous and transparent assessment process, fully aligned to university quality assessment and quality assurance standards, and accredited. RLtd regard APEL as an important tool in the development of the intellectual capital of their organisation and have nurtured it as such.

The second research objective was to determine whether there were any differences or new facets to APEL. There were new perspectives emerging from this case study in the way RLtd enact APEL, such as, engagement in APEL because it is embedded in the degree programme, resourcing APEL to ensure its success, clear communication and frameworks, and support of the widening participation agenda for different types of student. APEL is fully tracked, audited, with a robust framework clearly linked to academic quality standards.

Stockton's (2008) study shows 77% respondents reported insufficient enquiries from students, and this concurs with Betts & Crichton findings (2009) which also found that few students actually completed the APEL claim, not surprising considering students can be dissuaded from claiming by academics. 100% of the RLtd cohort made an APEL claim in 2013.This is a significant and important difference from traditional numbers. Indeed this was so different the trends were examined over the previous five years for RLtd, since the degree started, and the RLtd cohorts show the same consistently high trend in APEL claims, and so the 2013 cohort is not an exception. It is suggested this is a significant new finding, partly due to the new environment the universities find themselves operating in, and also to the way in which APEL is enacted in this context. As one RLtd participant said, "we take our Education seriously. People know APEL isn't a walk in the park. They have to work hard for it. We have our standards, and those of the university, and anything less will not do".

The final research objective was to capture from the management discourse around APEL if there was any learning and points for improvement. This study shows that there are learning points that HEI's can adopt such as adopting a strategic more student-centred approach to APEL. This takes into account the

students' changing environment especially in 2013 where they may acquire a taste for APEL and perhaps saving on some of the debt burden for education provision.

This case study has shown that it is possible to release the potential of APEL, and in a way that satisfies the needs of various stakeholders, APEL needs to fight for its place amongst the many other strategic priorities on the HE agenda. Stockton (2008) found that although in principle the higher education centres are in favour of adopting APEL policies, it is often difficult to implement across all subject areas as a cross-college policy. This too was a finding in this study: "the policy is made in one area, and it's implemented in another. Implementation and communication is down to the Heads and the Deans of Faculty" (UKU respondent). This tends to lead to quite a chasm, a disjoint between policymaking and those who enact the policies, and are responsible for their effectiveness. In Industry there can rarely afford to be such a disconnect as income, customer and staff satisfaction are dependent on effective implementation and enactment of the policy in the organisation, and this exemplified in the RLtd case study, where there is clear ownership of the policy and its enactment, right through to its review and improvement.

5. Conclusions

The research showed absolute clarity of understanding of APEL, reasons for undertaking the accreditation, and its value to the respondents. Therefore in general terms the study does not reveal much change in perception regarding what APEL is or what it stands for. It does show excellent student understanding and satisfaction with the concept, nature and personal experience of APEL. Trowler (1996 p8) found "there has been almost no attempt to substantiate or refute the claims through...study of the student experience of APEL or to identify how students respond to different ways of implementing the process." This study has attempted to provide evidence of this student perspective.

The case study shows an example of one collaborative partnership that has enacted APEL policy to successfully achieve 100% claims in APEL. It also demonstrates evidence of good HE-industry relations, the widening participation agenda, student satisfaction and employability, as these students are released from the programme theoretically qualified at a higher level, but also ready practically to deliver better results. It also goes some way to contribute evidence of the student experience of APEL, fulfilling in some small way, Trowler's (1996 p8) observation "there has been almost no attempt to substantiate or refute the claims through...study of the student experience of APEL".

Many themes have surfaced in this research supporting what was known years ago; these themes are captured and well documented and enacted in practice today. This case study has shown enactment of the policy and its potential in action. However, much of the literature examines APEL within HE; this research in the RLtd case and context highlights some interesting new aspects in the 2013 environment, where APEL has been used well as part of their collaborative agreement.

The research indicates strongly that APEL would become more accessible to a larger range of students, if there was a predetermined route for students to follow (Stockton 2008). With the number of UK students at HEI's expected to fall over the next 10 years (BBC: 2008) it is becoming more apparent that courses may become more appealing to non-traditional students. APEL may encourage mature students back into education, or graduates to complete secondary degrees or higher level qualification to further their careers. The sound enactment of an APEL policy which could possibly reduce the financial burden

through validation of existing skills could be seen as a step towards extending opportunities and promoting applications. Hence the findings from this collaborative venture and the examination of APEL shows potential for the future.

More recent development with collaborative partners such as with UKU and RLtd shows that APEL could have important consequences for the developing nature of higher education, subject to learning outcomes being clear, and support offered to the students and accrediting tutors. As long as this is correctly administered and quality assured, as can be seen this has a number of benefits for HE and collaboration, benefits for the commercial organisation, and certainly developmental benefits for the individual. The HE environment is changing, and the developmental approach is perceived by some to be time consuming but worth it for the student.

One of the original questions posed at the start of this paper was "How has APEL developed to accommodate this changed environment in which it is operating?" Through this case study, and in this context it can be seen APEL has grown up. It has been taken seriously and enacted comprehensively from policy through enactment to review and improvement. This takes account of the context and environment in which it is operating as the policy is alive and well, and will no doubt continue to evolve, or not, to suit its circumstances. Employer engagement was identified by Leitch (2006) as an essential ingredient in ensuring that the workforce of the future has the appropriate knowledge, skills and understanding to contribute to an increasingly complex working environment. APEL could play an important part.

Earlier on in the paper, APEL was compared to an oyster; oysters can be an acquired taste, and may not be for everyone, but for those who appreciate them, they can be source of great value and treasure...and can be fulfilling for those who take the time to enjoy the experience.

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Learning, Boundary Crossing and Activity Systems: The Case of the Foundation Degree at Restaurants Ltd

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Abstract: The purpose of the paper is to examine the link between Higher Education learning and the reconstruction of the learning back in the workplace, in a case study organisation with graduands from the foundation degree. Results from the interviews and questionnaires suggested that the respondents felt the learning was used back in the workplace. This study provides examples of the reconstructed learning. In conclusion, there is clear evidence of learning and linkages between HE learning and the reconstruction of learning in the workplace using the activity theory model. It is the nature of the assessment objects and the philosophy and culture driving the degree that largely facilitates this reconstruction of learning. The paper seeks to contribute to the scarce data identified in the work based learning literature identified by Smith et al (2013).
Key words: reconstruction of learning, activity-systems.

1. Introduction

The purpose of this paper is to explore the connections between Higher Education (HE) learning and understanding how learning is applied back in the workplace in a small scale case study using Engestroms' activity theory (2001). This will be done by evaluating the learning undertaken by a group of HE students studying for a foundation degree in a case study organisation, RLtd.

RLtd have a work-based learning approach of the foundation degree philosophy, which is to ensure that the learning has value to the business. This links to Ghobadian (2010) statement that work based learning (WBL) programmes specifically tailored to employers' needs might well be part of a viable remedy which may help the partnership with industry and academia, and the overall value of education to the economy and business. This is especially relevant to this study, which in part sets out to prove his diagnosis, not only on WBL but in a wider context also. This is to support Ghobadian's (2010) diagnosis of a rapidly increasing academia-praxis "gulf", i.e. where business school academic researchers are not addressing the needs of businesses enough.

Foundation degrees (FD's) in the UK were introduced under the Labour government (Dfes, 2003) as an intermediate, vocational-based sub-degree qualification that would meet the needs of employers. This study contributes to the government agenda of developing the workforce and business. Harvey (2009) undertook a literature review of research surrounding FDs, and one particular finding from this study demonstrated a need for further research into FDs. Boud and Soloman (2001) define work-based learning as "a partnership is established between an external organisation and an educational establishment specifically to foster learning", further specifying "learning projects are undertaken with the given needs of the workplace" and highlighting "learning is designed not just to extend the skills and knowledge of the individual but to make a difference to the organisation".

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This is critical as it benefits the student with a qualification, RLtd with increased customers and therefore more profits, and the HEI with more income, as per the service profit chain model (Heskett et al, 1994). This programme is an example of the attempt to create a closely aligned relationship between learning and practice, aligned to business goals.

This study investigates this learning reconstruction based on Engestrom's model (1987):
1. How and to what extent is the learning reconstructed back in the workplace?
2. To what extent does boundary crossing and the use of activity theory (Engestrom, 1987) help or hinder the reconstruction of learning?
3. What do the students find most useful?

Key concepts and arguments contained in this literature to support this study are discussed below.

2. Literature Review

Longhurst's (2010) claim that the design of Foundation degrees will provide a different but valued and genuinely improved provision for students and employers is critical to this study. Saunders (2006) uses a functionalist narrative as a means of explaining how the education role should have many facets relating to equipping people with skills and knowledge required by Industry. Critically, this view presupposes that Industry requirements are understood. Individuals and organisations can invest in education and "this investment will pay back, in increased wealth creation, productivity and competitiveness, and in individual terms, in better jobs, more money, prestige and life chances" (Saunders, 2006; Brennan etal., 1996). This is a logical and accepted theory, but some university faculties have been criticised as being out of touch with the society and industry it serves as "currently higher learning is often still too much a matter of classroom experience of book knowledge that is not sufficiently related to reality" (Van Rooijen, 2012). The RLtd case study shows the curriculum has been purposefully designed to encompass both the HE knowledge and the practical needs of the workplace.

A social practice is behaviour as we have already discussed which is recurrent and shaped by a complex set of personal and collective knowledge resources (Wenger 1999). Evaluative research requires that something new has happened, something has changed in practice so the concept of practice is a Giddensian (1979) one. The diagram below is a depiction of the transfer of learning in RLtd of the foundation degree as an activity system: orientating evaluative research into the work environment (adapted from Saunders, 2012).
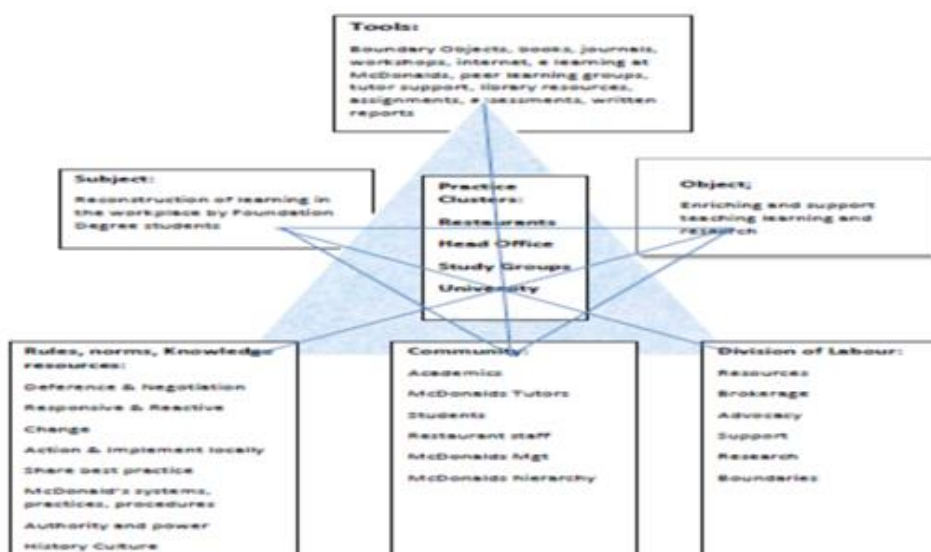
Figure 1: Transfer of learning

Within the activity system, the relationships in the community are highlighted, and as Vygotzy (1978) noted it assists in identifying where power dimensions may lie, as this may have been under- emphasised in Wenger (1999). For example, in the case study the power of the management and the tutors at Head Office yield high power, as this affects not only the career direction of the student, but the job itself, as judgements are made about capabilities based on the outcomes of the degree.

The activity system is useful in that it helps in identifying what resources may be available, for example who and what exists to assist in achieving the goal with the reconstruction of knowledge. The division of labour and its impact on the reconstruction will be evaluated in the study. The clusters of practice at the heart of the model are vital to show the student and tutors the boundaries to be crossed, and the boundary objects and boundaries to be crossed in order for the reconstruction to be successful. At times, this may be undertaken knowingly, whereas at other times, this is simply done unconsciously as it is the right thing to do, and the learning from the foundation degree acts as the catalyst. The locus of power is not prominent in social practice theory but it does appear in this case study in a number of ways, and in a variety of guises, and will be explored in the results.

Another pertinent perspective in this context on HE/work connectedness is boundary crossing, and this is important because of the time and place. The tutors are brokers as they help to sift and select the knowledge and practice from the classroom applicable to a different context (i.e. RLtd) but so too are the managers themselves; this the boundary crossing becomes iterative as students physically attend the university premises and return to the workplace, and also with the assessments and knowledge crossing boundaries for submission, marking, grades being returned and learning transferred and then reconstructed and used in the workplace. It is recognised that learning has to cross boundaries, and as Akkerman et al (2010) state, boundaries are becoming more numerous and explicit because of increasing specialization. The term boundary and boundary-crossing (Engeström, Engeström, & Kärkkäinen, 1995) encapsulates the challenges in education and work to create possibilities for learning, participation and collaboration across a diversity of sites, both within and across institutions (Ludvigsen et al, 2010).

Hargreaves (2000) identifies situations where the professional uses learning back in the workplace and is where a work situation is no longer effective or efficient so the "professional uses their knowledge repertoire". According to Lave (1988) the situated approach to learning is most effective when there is genuine participation in activities such as work.

Engestrom (1987) questioned what is done with the learning back in the workplace and what key actions are taken. This is important because of what the learner does with their learning (or not) on their return to the workplace. For situated learning theory (Lave & Wenger, 1991), motivation to learn stems from participation in culturally-valued collaborative practices in which something useful is produced. The boundary crossing narrative offered by Saunders (2012) highlights new perspectives on the relationships between education, learning and work. This relates to the notion of transfer use or reconstruction of knowledge in the workplace, as these words do not do justice to the complex social and cognitive process interaction that occurs as boundary crossing is undertaken (Beach, 2003). This is at the heart of what this study aims to show: what exactly have the students at RLtd done with their learning? The next section will explain the methodology used in the data collection and analysis

3. Research Methodology

This small-scale pilot study was conducted in RLtds with the latest cohort of foundation degree students (20 in total) to provide the latest perceptions and observations of what is actually happening in the workplace. Dexter and Seden (2012) highlighted the value of small scale research projects as having many positive impacts, amongst those being how the projects have benefited students and staff enhanced the organisational culture, provided richer and deeper learning opportunities, provided a strengthened ethos of continuous learning and improvement and identifying and addressing barriers to better practice.

Semi-structured interviews with 4 students, and two questionnaires (30% of the cohort graduands in 2013/14) provided the data for this research. 30% of this cohort is a reasonable sample of the whole population in terms of age, gender mix and geographical location mix. The students are mature part-time students, and speak from a managerial position within the RLtd, all managing and responsible for a Restaurant operation. It also allowed for comparison between the respondents. The interviews and questionnaires were coded for confidentiality purposes.

The argument for considering a social practice approach to the problems of use and usability is based on a concept of evaluation impact (the use of an evaluation to produce positive change) (Saunders 2012). In thematic analysis the data gathering instruments have to acknowledge that there are other activity systems which will interfere or impact in some way. This may explain why despite reassurances about the personal confidentiality, only two questionnaires were received, and the methodology gained much richer data by semi-structured interview. A brief comment is required on the return rate, as it was unusually low: it could also have been that the timing was inappropriate, as students had just graduated and completed their studies: it was a very busy time in their restaurants in the summer with staff leave and increased customer footfall, and consequently other priorities may have overtaken this survey.

4. Main Findings

This study set out to establish how and to what extent the learning undertaken by students completing the Foundation Degree at RLtd is reconstructed back in the workplace using boundary crossing and activity systems. The key findings are as follows:

1. A significant finding is that 100% of respondents agreed that they had learnt NEW things on the foundation degree, and it pinpoints where the most important learning is in the curriculum (leadership, business planning and internal communications)
2. The new learning and knowledge WAS USED to change things back in the restaurant and workplace: There is clear evidence of reconstructed learning (Colignon 1989) to enhance business operations in the restaurant and this has been evidenced by changed operational practices such as procedures, checklists, staffing, recruitment, rotas and business plans.
3. The number of actions taken are significant (more than 5 per student).
4. Boundary crossing from workplace to university and Head office gave the students time to think and reflect on the reconstruction of learning. The activity system discussed earlier (based on Saunders 2012) helps our understanding, e.g. the clusters of practice (Wenger 1999): the respondents reported they were very motivated after the on-site sessions at the university and Head offices as these boundary- crossings gave them a chance to reflect and reconcile theory and learning with the practice back in the workplace. These learning contexts (Saunders 1995) were a very important part of the reconstruction process and its success.
5. A significant finding is that 100% reported that the written report was THE most useful form of assessment as it contained a compulsory action plan which they could take back to the restaurant and implement. This correlates to the study by Ooms et al (2011) where it was found that when assignments are work-related, they become more meaningful or relevant for the students.
6. The main barriers to implementing the learning in the workplace were old paradigms of thinking and working by the managers; When asked about issues or barriers to the implementation of the learning, the main comment was "knowledge I didn't have at the start" (respondent 1), "getting used to using the new knowledge in an operation that you have been used to for years" (Respondent 3). This shows a very positive response, and also one that owns the responsibility for the reconstruction and transfer of the learning.
7. The benefits of small scale research identified by Dexter and Seden (2012) were also seen in the outputs of this case study, namely positive impacts such as an enhanced organisational culture, richer learning opportunities, a strengthened ethos of continuous learning and improvement and best practice was shared.

5. Conclusions

This paper has argued that the learning undertaken by the RLtd on the foundation degree is reconstructed back in the workplace, and there is evidence to show the learning has been applied to the business. This research demonstrated how boundary-crossing and the use of activity theory (Engestrom, 1987) aids learning reconstruction. This model assists identifying and understanding. Students can see a clear line of sight from across the boundaries of the education to the workplace and back. This paper supports Ghobadian's (2010) assertion that (WBL) programmes specifically tailored to employers' needs can help the partnership with industry and academia, and the overall value of education to the economy and

business. It also supports his argument which suggests that academic business researchers do not address the needs of businesses enough and if more was done it could relieve pressure on the "burgeoning academia-praxis "gulf". The activity system is an important depiction of RLtd's reconstruction of learning system, demonstrating complex interconnectivities and power plays involved.

The literature has shown that there are a number of perspectives on work connectedness, and many of these can be seen in this study. It is the extent to which these are effective in the RLtds context which will be new, with a foundation degree that is designed, delivered and assessed by RLtd that is not an educational institution.

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Problems Related to Large Classes in Teaching Comprehension in Nigerian Polytechnics and How to manage them.

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Abstract: *Teaching English is an academic core that needs concentration and attention of both the teachers and the students. However, large classes which are a reality in Abubakar Tatari Ali Polytechnic Bauchi, pose particular challenges to the teachers, more especially in teaching of reading comprehension. On the average, the population of the students ranges from 60-200 in a class. This study therefore uses classes of roughly 200 students for the research and come up with the result that the teachers face inherent logistical problems like movement of the teachers from one end of the classroom to another to control the climate of the class and to check their work, distribution of papers and collection of scripts during assessment, marking of assignments or homework etc. on the part of the students, large classes pose problems of passive learning, low motivation, lack of attention, noise making etc. to overcome these problems, this paper recommends that learners should work in groups, the teacher should do advanced organization and detailed planning of the lesson.*

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Recommendations towards improving low-cost housing delivery in the City of Johannesburg

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Abstract: The South African low-cost housing programme is one of the key government priorities. The current system of responding to the challenges and opportunities confronting delivery requires closer scrutiny. This research project focuses on low cost housing delivery in the City of Johannesburg, South Africa. There is still a significant backlog in this regard. This research may assist in providing practical and realistic recommendations which may be applied by policy makers and planners of the City and provincial Human Settlements department as well at the national Department of Human Settlements when consideration is lent to low cost housing policy options and implementation strategies and further attempts to establish whether the delivery of low-cost housing is managed appropriately where it seeks to identify aspects of improvement on the management and administration of this function in the City of Johannesburg.
Keywords: Low-cost housing, City of Johannesburg,

Introduction

South Africa faces major service delivery issues in its efforts to accommodate its ever-growing population. Urbanisation is on the increase. Service delivery protests abound. These challenges raise the question of how such a process should best be managed. Ultimately, it involves finding political and administrative governance solutions, increased accountability and proper (project) management practice.

The City of Johannesburg (CoJ) is increasingly host to a large and growing population of poor South Africans and non-South Africans, a trend that is driven both by in-migration and by organic growth associated with development. In spite of efforts by the City of Johannesburg to speed up housing delivery, system problems/challenges in the delivery chain of low-cost housing prevail. According to the Sustainable Housing Strategy of the City of Johannesburg (2001), the challenges facing the City in the delivery of low-cost housing include the following: land invasions; backyard shacks; informal settlements; new family structures; and inward-migration to the City of Johannesburg.

South African housing delivery statistics

The South African urban population is growing rapidly (total population change as per Census 2011: 40.5 million in 1996 to 51.7 million in 2011). According to the United Nations Development Programme about 71 % of South Africans will live in urban areas by 2030, a growth of nearly 80 %, by 2050. These migration patterns place greater responsibilities on provinces such as Gauteng (in which Johannesburg is located) and Western Cape to provide habitat. As such, delivery of low-cost housing has been a key focus of the African National Congress (ANC)-led government post-1994. Government has prioritised housing provision to eradicate abounding informal settlements.

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R49 billion had been spent on housing sector since 1995 (National Treasury, Provincial Budget and Expenditure Review: 2005/06 – 2011/12) which has yielded 2.604.763 housing units, both constructed or under construction. However, a backlog of about 2.5 million low-cost houses remains. Of the total backlog, the six urban cities the City of Johannesburg is one of the most affected (Stats SA, Community Survey, 2007).

Research Approach

This research study is qualitative and exploratory by nature. A case-study research method was used, which enables researchers to gain in-depth knowledge on the subject matter and to make new discoveries (Merriam, 2002:9). Semi-structured interviews were held with key role-players in the delivery of low-cost housing, who include senior government officials at the Department of Human Settlements, Gauteng Provincial Department of Human Settlements and City of Johannesburg. Furthermore, interviews were conducted with the Director responsible for housing at the National Treasury and the head of the Public-Private Partnerships Unit (PPP) in the National Treasury. In addition, documents ranging from scholarly journals, policy documents, and books relevant to the sector and topic were consulted. In addition, policy documents impacting on low-cost housing were perused. Finally, the authors also contributed to this article from their vantage point of being participant researchers by virtue of their involvement with the City of Johannesburg low-cost housing process.

Location of functions associated with delivery of low-cost housing in South Africa

The **Constitution of the Republic of South Africa,** (1996) stipulates that housing is a joint function of national and provincial governments, while Schedule 4 of the **Constitution of the Republic of South Africa**, (1996) provides for municipal competence over functions associated with housing. In terms of the **Housing Act,** 1997 (Act no. 107 of 1997), provincial governments must promote, coordinate and implement housing programmes within the framework of national policies. Province approves housing subsidies and projects and provides support to municipalities for housing development. Funding for housing is administered at provincial level and is released on the approval of individual projects at the discretion of the Members of the Executive Committees (MECs) for Human Settlements.

The concurrent housing delivery system is based on the principle of co-operation between the three spheres of government, i.e. local, provincial and national. While responsibility for certain functions are allocated to a specific sphere, there are interdependencies between the spheres which must be respected to ensure effective delivery of low-cost housing. The **Constitution of the Republic of South Africa, 1996** specifically envisages that as municipalities develop the necessary capability and capacity, the administration of low-cost function will be assigned to municipalities. Consistent with Section156 (4) of the **Constitution of the Republic of South Africa**, 1996, the National Housing Code (2009) (http://www.dhs.gov.za) lays the accreditation framework within which municipalities have to administer National Housing Programmes. This should enable municipalities to plan the implementation of low-cost housing on a co-ordinated basis. However, the accreditation is granted only on the basis of existing or created capacity within the identified municipality to ensure that service delivery is not impacted negatively.

Institutional arrangements

The current institutional arrangements for the delivery of low-cost housing are complex and continue to rely on co-operation among the three spheres of authority for human settlements. Even though the roles of national, provincial and local government are clearly defined accountability in delivery of the low-cost housing is seriously compromised. While the national Department of Human Settlement is responsible for policy development and funding allocation, the provincial departments of human settlement are responsible for policy implementation and actual disbursements of funding allocations to municipalities. Both these spheres have a responsibility to strengthen the capacity of municipalities in delivering low-cost housing. Taking a closer look at this arrangement, it may be stated that any success in the implementation of low-cost housing depends on well-co-ordinated policy initiatives, planning, budgeting and punctual implementation (management and administration). Accountability may be hard to achieve with this institutional arrangement as it requires comprehensive planning and co-operation among national, provincial and local governments. According to the National Treasury Budget Review (BR) (2012), accountability for housing delivery should shift from provinces to metropolitan municipalities over the medium term to allow better alignment in the planning and implementation of residential infrastructure and housing projects (National Housing Code, 2009).
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The National Treasury (Public Private Partnerships Unit) asserts that there was a lack of clarity about what the housing policy sought to achieve and prioritise i.e. rental stock or ownership. The slow process of accreditation had led to conflicting interests between provinces and municipalities as well as confusion over roles and responsibilities. It is further indicated that there was a lack of effort to foster private-sector partnerships.

There are currently three levels (and associated responsibilities) of housing accreditation according to which municipalities can be accredited: **Level 1-accreditation** (subsidy budget planning, allocation, priority programme management, project identification and administration)**; Level 2-accreditation** (programme management and administration which include project evaluation, approval, contract management, subsidy registration, programme management as well as cash flow projection, management and technical quality assurance) (the City of Johannesburg currently has this level of accreditation)**; and Level 3-accreditation** (includes subsidy payment disbursements, financial reporting and reconciliation as well as all responsibilities listed for Levels 1 and 2) (National Housing Code, 2009: http://www.dhs.gov.za).

Findings of a study conducted by the Financial and Fiscal Commission (FFC) on the critical challenges facing municipalities show that capacity constraints are often used to mask the real causes of municipal non-performance. For instance, **The Constitution of the Republic of South Africa**, (1996) establishes housing as a joint function of national and provincial governments, while Schedule 4, part B of the **Constitution of the Republic of South Africa**, (1996) assigns municipal competence to functions associated with housing development i.e. municipal planning, storm-water management systems in built-up areas, water and sanitation services, limited to potable water supply systems and domestic waste-water, and sewerage disposal systems. Furthermore, provincial governments promote, co-ordinate and implement housing programmes within the framework of national policies. Funding for housing is administered at provincial level and is released after approval of individual projects. Therefore, it is argued that local government performance was inconsistent not only because of capacity constraints, but also perhaps as a result of tensions between intergovernmental roles and responsibilities (lacking

coordination), the political-administrative interface, high vacancy rates and instability in the administrative interface, skills deficits, poor organizational design, inappropriate staffing, low staff morale and poor accountability for performance (FFC, 2012:2).

With a Level 2-accreditation, the role of City of Johannesburg in the delivery chain includes project identification, subsidy budget planning, programme management and planning. However, responsibility for subsidy payment disbursements, financial reporting and reconciliation lies with Gauteng Human Settlements. Assigned with these accreditation responsibilities, this is a significant step for the City of Johannesburg as this means that it will have the capacity to commission and produce project feasibility assessments, monitor quality assurance and programme management, and gain skills in project cash flow management and contract administration. Accredited with this level of accreditation, the City is better placed to integrate and co-ordinate its activities in the delivery chain of low-cost housing. National Treasury (NT) in Local Government Budgets and Expenditure Review (2011: 13,212) emphasises that empowering cities to perform the housing function will support integrated planning and spatial development, as well as greater accountability to communities.

The City of Johannesburg has implemented a Sustainable Housing Strategy (SHS) comprised of key aspects such as sustainable housing policy, strategic programmes, implementation guidelines, institutional framework and frameworks for budget estimates for housing. The Strategy specifically attends to: the location of new housing in remote sites far from work and other socio-economic amenities; a developer-focused delivery process; the lack of synergy with urban development priorities for Johannesburg, over-centralised decision making; dependence on the national capital subsidy; and high focus on ownership at the expense of alternatives such as social and rental housing.

The above, however requires a reasonable level of capacity to execute relevant functions. The issue of capacity is often cited as the main reason for functions not being devolved to municipalities. With reference to the City of Johannesburg, this may be the case more especially after having looked at the qualified audit report from the Auditor-General (AG) for the year ended 30 June 2012, which is the third consecutive one. For the 2011/12 financial year, the AG qualified the City on the audit outcome. Among others, the basis for qualified opinion relates to inconsistency of objectives, indicators and targets between planning and reporting documents. **The Municipal Systems Act**, 2000 (Act no. 32 of 2000), section 41 (c), requires that the integrated development plan (IDP) should form the basis for the annual report, which should report consistency on objectives, indicators and targets. This may be attributed to a lack of monitoring and reviewing of performance as required by section 41 (C) of the MSA (2000). The AG report further stated that the City of Johannesburg did not have a project management system to support financial information relating to infrastructure assets and Work in Progress. The inability to identify and acquire appropriate land for low-cost housing is also cited as factors. Furthermore, Management did not frequently review and monitor adherence to the Supply Chain Management (SCM) deviation framework resulting in repeated non-compliance findings.

Conclusion

Based on the research and above discussion, the researchers conclude by presenting the following findings (in the form of recommendations) that may impact on low-cost housing delivery in the City of Johannesburg:

1. Impeded intergovernmental co-ordination: As approval of projects at provincial sphere is not linked to overall municipal capital programmes, the misalignment between infrastructure programmes and housing programmes is exacerbated.
2. Location of functions: The spectrum of location of functions associated with housing development creates challenges at the point of implementation. This becomes evident when municipalities have to plan for integration of these services and when implemented, funding is not available since the anticipated funding has been assigned elsewhere, in some instances to meet needs other than those of local municipalities.
3. Complex arrangement of institutional powers and functions: Funding streams between the different spheres of government have to be properly co-ordinated.
4. Policy implementation: Policies have not proved to be sufficient for improving delivery, because they require full understanding and proper co-ordination and collaboration among key stakeholders to ensure efficient delivery of low-cost housing – relating to (project) management and administrative capacity.
5. The misalignment among the spheres of government and the private sector: Access and release to well-located land for the construction of low-cost housing has been identified as a major issue that impacts negatively on the delivery of low-cost housing. Furthermore, identification, acquisition and release of state-owned and private land are very slow processes.
6. Land availability: Land which could be utilised for housing development in cities is often reserved for high-cost housing and/or excessively expensive.
7. Increase in population growth in the City of Johannesburg: Enhancing the need for increased capacity to fast-track delivery - relating to (project) management and administration capacity.

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Multi-objective Supply Chain Design Problem

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Abstract: *Multi-objective supply chain design problem is formulated and solved by De Novo approach. The suitability of supply chains can be measured by multiple objectives, such as economic, environmental, social, and others. Traditional concepts of optimality focus on valuation of already given systems. Multi-objective linear programming (MOLP) is a model of optimizing a given system by multiple objectives. In MOLP problems it is usually impossible to optimize all objectives together in a given system. As a methodology of optimal system design can be employed De Novo MOLP for reshaping feasible sets in linear systems. Innovations bring improvements to the desired objectives and the better utilization of available resources.*
Keywords: Supply chain, Multiple objectives, De Novo optimization.

1. Introduction

A structure of supply chains is composed from potential suppliers, producers, distributors, retailers and customers etc. The units are interconnected by material, financial, information and decisional flows connecting participants in both directions. Most supply chains are composed of independent units with individual preferences. Each unit will attempt to optimize his own preference. Behaviour that is locally efficient can be inefficient from a global point of view. An increasing number of companies in the world subscribe to the idea that developing long-term coordination and cooperation can significantly improve the efficiency of supply chains and provide a way to ensure competitive advantage. Supply chain management is now seen as a governing element in strategy and as an effective way of creating value for customers. Supply chain management has four stages: design, control, performance measurement, and improvements. The performance of supply chains can be measured by multiple objectives, such as economic, environmental, social, technological, and others. Multi-objective supply chain design problem is formulated and solved by De Novo approach.

Traditional concepts of optimality focus on valuation of already given systems. Multi-objective linear programming (MOLP) is a model of optimizing a given system by multiple objectives. In MOLP problems it is usually impossible to optimize all objectives together in a given system. Trade-off means that one cannot increase the level of satisfaction for an objective without decreasing this for another objective. Trade-offs are properties of inadequately designed system and thus can be eliminated through designing better one. The purpose is not to measure and evaluate tradeoffs, but to minimize or even eliminate them. An optimal system should be tradeoff-free.
As a methodology of optimal system design can be employed De Novo programming for reshaping feasible sets in linear systems. Basic concepts of the De Novo optimization are summarized. The paper presents approaches for solving the Multi-objective De Novo linear programming (MODNLP) problem for design of multi-objective supply chains. The approach is based on reformulation of MOLP problem by given prices of resources and the given budget.

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Searching for a better portfolio of resources leads to a continuous reconfiguration and reshaping of systems boundaries. Technological innovations bring improvements to the desired objectives and the better utilization of available resources. These changes can lead to beyond tradeoff-free solutions.

2. Literature Review

Supply chain management has generated a substantial amount of interest both by managers and researchers. Supply chain management benefits from a variety of concepts that were developed in several different disciplines as marketing, information systems, economics, system dynamics, logistics, operations management, and operations research. There are many concepts and strategies applied in designing and managing supply chains (see Simchi-Levi et al., 1999). The expanding importance of supply chain integration presents a challenge to research to focus more attention on supply chain modelling (see Tayur et al., 2000). In supply chain behaviour are many inefficiencies. Information sharing in supply chains can help to reduce inefficiencies (see Fiala, 2005).

Traditional concepts of optimality focus on valuation of already given systems. New concept of designing optimal systems was proposed (see Zeleny, 1990). Multi-objective linear programming (MOLP) is a model of optimizing a given system by multiple objectives. As a methodology of optimal system design can be employed De Novo programming for reshaping feasible sets in linear systems. The approach is based on reformulation of MOLP problem by given prices of resources and the given budget. Searching for meta-optimum with a minimal budget is used. The instrument of optimum-path ratio is used for achieving the best performance for a given budget. Shi (1995) proposed other types of optimum-path ratios in De Novo programming problems. Searching for a better portfolio of resources leads to a continuous reconfiguration and reshaping of systems boundaries. Innovations bring improvements to the desired objectives and the better utilization of available resources.

The tradeoffs-free decision making has a significant number of methodological applications. All such applications have the tradeoffs-free alternative in common:
- Compromise programming – minimize distance from the ideal point.
- Risk management – portfolio selection – tradeoffs between investment returns and investment risk.
- Game theory – win-win solutions.
- Added value – value for the producer and value for the customer – both must benefit.

There are real applications of De Novo approach. For example production plan for a real production system is defined taking into account financial constraints and given objective functions (Babic and Pavic, 1996). The paper (Zhang et al., 2009) presents an Inexact DNP approach for the design of optimal water-resources-management systems under uncertainty. Optimal supplies of good-quality water are obtained in considering different revenue targets of municipal–industrial–agricultural competition under a given budget.

3. Research Methodology

Two models were used for evaluation of multi-objective supply chains. Multi-objective linear programming (MOLP) is a model of optimizing a given system by multiple objectives. Multi-

objective De Novo linear programming (MODNLP) is a problem for designing an optimal system by reshaping the feasible set.

Optimizing given systems

In MOLP problems it is usually impossible to optimize all objectives together in a given system. Trade-off means that one cannot increase the level of satisfaction for an objective without decreasing this for another objective. Multi-objective linear programming (MOLP) problem can be described as follows

$$\text{"Max"} \quad z = Cx$$
$$\text{s.t.} \quad Ax \le b, \ x \ge 0 \tag{1}$$

where C is a (k, n) – matrix of objective coefficients, A is a (m, n) – matrix of structural coefficients, b is an m-vector of known resource restrictions, x is an n-vector of decision variables. In MOLP problems it is usually impossible to optimize all objectives in a given system. For multi-objective programming problems the concept of non-dominated solutions is used (see for example Steuer, 1986). A compromise solution is selected from the set of non-dominated solutions. There are proposed many methods. Most of the methods are based on trade-offs. The next part is devoted to the trade-off free approach.

Designing optimal systems

By given prices of resources and the given budget the MOLP problem (1) is reformulated in the MODNLP problem (2)

$$\text{"Max"} \quad z = Cx$$
$$\text{s.t.} \quad Ax - b \le 0, \ pb \le B, \ x \ge 0 \tag{2}$$

where b is an m-vector of unknown resource restrictions, p is an m-vector of resource prices, and B is the given total available budget.
From (2) follows

$$pAx \le pb \le B.$$

Defining an n-vector of unit costs $v = pA$ we can rewrite the problem (2) as

$$\text{"Max"} \quad z = Cx$$
$$\text{s.t.} \quad vx \le B, \ x \ge 0 \tag{3}$$

Solving single objective problems

$$\text{Max} \ z^i = c^i x \quad i = 1,2,\ldots,k$$
$$\text{s.t.} \quad vx \le B, x \ge 0 \tag{4}$$

$z*$ is a k – vector of objective values for the ideal system with respect to B.
The problems (4) are continuous "knapsack" problems, the solutions are

$$x_j^i = \begin{cases} 0, j \neq j_i \\ B/v_{j_i}, j = j_i \end{cases} \quad \text{where} \quad j_i \in \left\{ j \in (1,...,n) \left| \max_j (c_j^i / v_j) \right. \right\}.$$

The meta-optimum problem can be formulated as follows

$$\text{Min} \quad f = vx$$
$$\text{s.t.} \quad Cx \geq z^*, x \geq 0 \tag{5}$$

Solving the problem (5) provides solution: x*, B* = vx*, b* = Ax*.
The value B^* identifies the minimum budget to achieve z^* through solutions x^* and b^*. The given budget level $B \leq B^*$. The optimum–path ratio for achieving the best performance for a given budget B is defined as

$$r_1 = \frac{B}{B^*}$$

The optimum-path ratio provides an effective and fast tool for the efficient optimal redesign of large-scale linear systems. Optimal system design for the budget B:

$$x = r_1 x^*, \, b = r_1 b^*, \, z = r_1 z^*.$$

4. Main Findings

In the next part a multi-objective supply chain design problem is formulated. The problem is solved by De Novo optimization approach.

Multi-objective supply chains
The mathematical program determines the ideal locations for each facility and allocates the activity at each facility such that the multiple objectives are considered and the constraints of meeting the customer demand and the facility capacity are satisfied. The presented model of a supply chain consists of 4 layers with m suppliers, $S_1, S_2, ... S_m$, n potential producers, $P_1, P_2, ... P_n$, p potential distributors, $D_1, D_2, ... D_p$, and r customers, $C_1, C_2, ... C_n$. The following notation is used:
a_i = annual supply capacity of supplier i, b_j = annual potential capacity of producer j,
w_k = annual potential capacity of distributor k, d_l = annual demand - customer l,
f_j^P = fixed cost of potential producer j, f_k^D = fixed cost of potential distributor k,
c_{ij}^S = unit transportation cost from S_i to P_j, c_{jk}^P = unit transportation cost from P_j to D_k,
c_{kl}^D = unit transportation cost from D_k to C_l, e_{ij}^S = unit pollution from S_i to P_j,
e_{jk}^P = unit pollution from P_j to D_k, e_{kl}^D = unit environmental pollution from D_k to C_l,
x_{ij}^S = number of units transported from S_i to P_j, x_{jk}^P = number of units transported from P_j to D_k, x_{kl}^D = number of units transported from D_k to C_l,
y_j^P = bivalent variable for build-up of fixed capacity of producer j,
y_k^D = bivalent variable for build-up of fixed capacity of distributor k.
Using the above notations the problem can be formulated as follows:

The model has two objectives. The first one expresses minimizing of total costs. The second one expresses minimizing of total environmental pollution.

$$\text{Min } z_1 = \sum_{j=1}^{n} f_j^P y_j^P + \sum_{k=1}^{p} f_k^D y_k^D + \sum_{i=1}^{m}\sum_{j=1}^{n} c_{ij}^S x_{ij}^S + \sum_{j=1}^{n}\sum_{k=1}^{p} c_{jk}^P x_{jk}^P + \sum_{k=1}^{p}\sum_{l=1}^{r} c_{kl}^D x_{kl}^D$$

$$\text{Min } z_2 = \sum_{i=1}^{m}\sum_{j=1}^{n} e_{ij}^S x_{ij}^S + \sum_{j=1}^{n}\sum_{k=1}^{p} e_{jk}^P x_{jk}^P + \sum_{k=1}^{p}\sum_{l=1}^{r} e_{kl}^D x_{kl}^D$$

Subject to the following constraints:
- the amount sent from the supplier to producers cannot exceed the capacity

$$\sum_{j=1}^{n} x_{ij} \leq a_i, \quad i = 1, 2, ..., m,$$

- the amount produced by the producer cannot exceed the producer capacity

$$\sum_{k=1}^{p} x_{jk} \leq b_j y_j, \quad j = 1, 2, ..., n,$$

- the amount shipped from the distributor should not exceed the distributor capacity

$$\sum_{l=1}^{r} x_{kl} \leq w_k y_k, \quad k = 1, 2, ..., p,$$

- the amount shipped to the customer must equal the customer demand

$$\sum_{k=1}^{p} x_{kl} = d_l, \quad l = 1, 2, ..., r,$$

- the amount shipped out of producers cannot exceed units received from suppliers

$$\sum_{i=1}^{m} x_{ij} - \sum_{k=1}^{p} x_{jk} \geq 0, \quad j = 1, 2, ..., n,$$

- the amount shipped out of distributors cannot exceed quantity received from producers

$$\sum_{j=1}^{n} x_{jk} - \sum_{l=1}^{r} x_{kl} \geq 0, \quad k = 1, 2, ..., p,$$

- binary and non-negativity constraints

$$y_j, y_k \in \{0,1\},$$

$$x_{ij}, x_{jk}, x_{kl} \geq 0, \quad i = 1, 2, ..., m, \quad j = 1, 2, ..., n, \quad k = 1, 2, ..., p, \quad l = 1, 2, ..., r.$$

The formulated model is a multi-objective linear programming problem (MOLP). The problem can be solved by some MOLP methods (see Steuer, 1990).

De Novo approach for multi-objective supply chains

The De Novo approach can be useful in the design of the multi-objective supply chain. Only a partial relaxation of constraints is adopted. Producer and distributor capacities are relaxed. Unit costs for capacity build-up are computed:

$$p_j^P = \frac{f_j^P}{b_j} = \text{cost of unit capacity of potential producer } j,$$

$$p_k^D = \frac{f_k^D}{w_k} = \text{cost of unit capacity of potential distributor } k.$$

Variables for build-up capacities are introduced:

u_j^P = variable for flexible capacity of producer j,

u_k^D = variable for flexible capacity of producer k.

The constraints for non-exceeding producer and distributor fixed capacities are replaced by the flexible capacity constraints and the budget constraint:

$$\sum_{k=1}^{p} x_{jk} - u_j^P \leq 0, \ \ j = 1, \ 2, \ ..., \ n,$$

$$\sum_{l=1}^{r} x_{kl} - u_k^D \leq 0, \ \ k = 1, \ 2, \ ..., p,$$

$$\sum_{j=1}^{n} p_j^P u_j^P + \sum_{k=1}^{p} p_k^D u_k^D \leq B.$$

The De Novo approach was tested on examples. The results for a supply chain with 3 potential producers, 3 potential distributors, 3 customers, and 2 criteria are given in Tab. 1.

Tab. 1. Results for the supply chain design

	Min z_1	Min z_2	Compromise	De Novo
z_1	2660	4670	3830	3644
z_2	2900	1350	1800	1700
B	460	520	730	444

The values of criteria z_1 and z_2, and the budget B are compared in solutions given by different approaches. The first two approaches minimize separately one criterion. Compromise solution is computed by STEM iterative approach for multi-objective programming problems. The De Novo solution is better in all values than the solution obtained by STEM. De Novo approach provides a better solution in both objectives and also with lower budget because of flexible capacity constraints. The capacity of supply chain members has been optimized with regard to flows in the supply chain and to budget.

The multi-objective optimization can be then seen as a dynamic process. Technological innovations bring improvements to the desired objectives and the better utilization of available resources. The technological innovation matrix $T = (t_{ij})$ is introduced. The elements in the structural matrix A should be reduced by a technological progress. The problem (2) is reformulated in to the innovation MODNLP problem (6)

$$\text{"Max"} \quad z = Cx$$
$$\text{s.t.} \ \ TAx - b \leq 0 \ , pb \leq B, x \geq 0 \quad\quad (6)$$

5. Conclusions

De Novo approach was applied for multi-objective supply chain design problem and provides better solution than traditional approaches applied on fixed constraints. The design problem was formulated as MOLP problem. The economic and environmental objectives were used in the model but multiple

objectives can be used in general. Technological innovations bring improvements to the desired objectives and the better utilization of available resources. These changes can lead to beyond tradeoff-free solutions. De Novo programming (DNP) approach is open for further extensions as fuzzy DNP, interval DNP, complex types of objective functions and continuous innovations.

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An Overview of Globalization and the African Economic Crisis

Onyiaji, Judith Chiaka*

Abstract: *Globalization is a phenomenon that is fast sweeping through the world and of which Africa is not immune to, and it is very instrumental in molding the world from politics to economy, from religion to culture. In understanding the relationship existing between the African economy and the wider world some economic indicators will be a useful tool in this analysis. The research focuses on how globalization has shaped the African economy, taking into cognizance the impact of the concept on Africa's key sectors like Poverty, Trade Relations. Having identified the crisis associated with globalization as it relates to Africa's economy, the research recommend sustained and profitable engagement of Africa with the developed world and good governance is needed to strengthen the development process in African states if these recommendations are implemented the African economy will be strategically positioned in the complex theatre of world economy.*
Key Words*: Globalization; Poverty; Trade Relations, sustained and profitable.*

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Exploring Behavior in Social Networking Environments

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Abstract *The use of social media (SM) networks is prevalent today. Companies worldwide seeking to maintain and/or expand their customer base are embracing social media networks, even where the technology infrastructure is poor, and the cost of service relatively high. It is, therefore, essential to study the behavior of clients on those networks. Studies of behavior in social psychology reveal several concepts to be explored. The first concept is efficacy: self and collective. While several studies in information systems have linked self-efficacy to behavior, research is short on collective efficacy. Another concept is power or agency. When using SM networks do people feel empowered? They can express their opinion? They feel engaged? Another concept is capital. In addition to financial and physical capital, there is social, cultural, and human capital. The presence (or lack of) these forms of capital affects behavior. In this study I will explore the relationship between the above concepts and behavior based on related and/or newly developed instruments and sound statistical methods. I expect the study to reveal that efficacy, agency, and capital, do explain behavior in social networking environments.*
Keywords*: social media networks, behavior, efficacy, agency, capital*

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