A case study of software procurement strategies in Sudanese organizations

Mohamed Abbas, Hisham Abu Shama and Gada Kadoda***
Department of Computer Science, University of Khartoum, P.O. Box 321, Khartoum, Sudan,
Email: gadoda@gmail.com

Key words: Software Procurement, software acquisition, COTS software products, software
quality and measurement

Abstract

*Generic software components that can be procured off-the-shelf (COTS) are now available to
perform most of the functions that in the past required bespoke development. The use of
commercial software products in organizations is being driven by its potential for reducing
the cost and time to develop software systems. A number of COTS-based development
methods and standards have been proposed in the literature, however, many organizations
struggle in their attempts to select appropriate software products for use in systems. This
paper examines procurement activities carried out in three organizations with the aim of
identifying their risks and potentials. The outcome of the work highlighted areas of
improvement, e.g. business requirements analysis, risk assessment, and documentation of
procurement projects. The authors argue that availability of products because of language,
cost, embargo add a further set of complexities to procurement in developing countries. The
paper concludes by making recommendations to foster the informal networks of information
exchange on products that exist among IT staff in similar (also across) organizations, as a
possible medium for wider participation in the development of national standards, as well as
outlining final thoughts on some of the imperative tasks and challenges that remain to be
addressed in country efforts on software procurement and development.*

INTRODUCTION

Generic software components that can be procured off- the-shelf (COTS) are now available

to perform most of the functions that in the past required bespoke development. The use of
commercial software products (or COTS) in organizations is being driven by its potential for
reducing the cost and time to develop software systems. A number of COTS-based development methods and standards have been proposed in the literature, however, many
organizations struggle in their attempts to select appropriate software products for use in
systems. Given the complexities of today's software systems, the cost and risk of
procuring/purchasing wrong package due to inadequate requirements acquisition and product
selection is large.
Central to COTS evaluation for suitability is the process of establishing the context of
procurement such as functional, technical, business, etc. that determine the criteria for
evaluation criteria to assess the product. [1] While some of the challenges come from limited
access to internal design of products and scope for evaluation of fitness [10], other challenges
come from the dynamic nature of COTS market and rapid change in technology. Software
products procurement in developing countries have additional sets of challenges that come
from being at our infancy as software consumers, and hence have little effect on its market
and the development of standards. As part of local efforts by government to regulate and
develop standards for software procurement, this paper compares and evaluates processes

*** Author for correspondence.

employed at three local organizations with the aim of identifying their risks and potentials,
and propose a set of guidelines that can support organizations in making carefully reasoned
and sound product decisions, as well as improve their process models.
The paper is structured to give in section 2 an overview of the concepts that are knitted in the
procurement process and common procurement activities and steps proposed in the literature.

Section 3 presents procurement processes from the case study which is followed by comparative and critical analyses in section 4. Section 5 concludes with highlighting some of
the questions and thoughts on product evaluation, process improvement, and challenges in
procurement processes that arose from the study.

Software Procurement Concepts and Processes

The development of systems using COTS products bring fundamental changes to the way
organizations do their work [4]. The central cause of change is that the organization becomes
a consumer with less or no control over the product implementation and adopts standard
interfaces based on COTS market. Some familiar software engineering activities are altered.
Requirements analysis may have to consider standard implementations, architecture design
must be performed together with package evaluation; and new activities will become
significant parts of development process, for example product adaptation and integration.
These changes require organizations to have an understanding of the capabilities and
limitations of COTS products and standards in their domain, conduct market research and
product evaluation to select products, and involve different kinds of expertise such as
business analysts and legal consultants in the procurement process.
There are two types of standards that an organization must deal with. The first are the
standards used in implementations to be able to balance requirements with available product
features. The second are standards and recommended practice for conducting procurement
processes. For example, IEEE 1062 suggests a number of major phases, steps and milestones
for acquiring COTS products, and its variant MOTS (Modified-off-the-shelf), as well as
provides checklists to assist organizations in developing their own processes [6]. Another
standard that is not specifically geared for COTS but offer related guidelines is the ISO 9126
for software quality. A number of COTS-based development methods have also been

proposed, for example OTSO (Off-the-Shelf Option) and PORE (Procurement-Oriented Requirements Engineering). The OTSO method starts with a specified set of requirements
and provides techniques to define evaluation criteria and to compare the costs and benefits of
alternative products [7], while PORE [13] integrates the process of requirement specification
and product evaluation using techniques from requirements acquisition and engineering such
as card sorting and laddering, and provides guidelines to design evaluation test cases.

268

Investigating current procurement practice in Sudanese Organizations

This section will consider how three very different organizations deal with the problem of
procuring an appropriate COTS product. One organization, ("A") is a major telecommunication company that is privately owned. The second organization, ("B") is a
government owned bank and the last organization ("C"), is a large industrial corporation that
is a public/private partnership. While the three use very different approaches to COTS
evaluation, still it was observed that the abstract process ideas underlying are similar. The
procurement project consists of three major steps to initiate, select, install and integrate of the
COTS product in the system. And the authors also learn that differences in approaches
support the notion that whatever the actual process used, it is driven by context. The
subsections below highlight the main features of the organizations and their COTS software
procurement processes (depicted in Figures 1, 2 and 3 - in the Appendix).

Organization "A"

This is an international telecommunication company that bought a public owned company and has more than 20 branches worldwide. Software is fundamental to the operation
of the organization which procures from different ranges of COTS products, e.g. Antivirus,
Billing System. The company is frequently engaged in multiple procurement projects and
technology upgrades. Procurement projects are initiated at middle management level and the

decision to procure is taken in consultation and approval of higher management. Selection of
products considers vendors of existing running components of the system, for example the
Reporting system solution used the same vendor of the Billing system. A main feature of the
procurement process is the existence of end-of-project evaluation.

Organization "B"

This organization is a large government owned bank with 35 national branches, and
one branch outside Sudan. Although software is an integral part of the bank system and
improves its performance, failure of the computer system is not as catastrophic as for "A",
because the bank can revert to its established manual system. The current core system the
bank uses is a Jordanian COTS product that is implemented in COBOL and runs under DOS
on Novell system. The rate of change of computer systems is slow in this organization and
undergoes various government regularity measures on spending and on procedures followed
from the Central Bank. The organization uses a tender system to select products and involves
representatives from different stakeholder groups in the organization in the procurement
team.

Organization "C"

This is an industrial corporation that is owned by government, and private national
and international investors. The company's sites of management and production are located
in Sudan, with one office abroad. The main type of COTS the company deals with is CRM
(Customer-Relationship Management) systems. A continuous business and needs analysis
(using external consultants for large projects) is conducted in the organization that can initiate
a procurement project, and yield a list of requirements as well as possible solutions. The
procurement process in this organization is characterized by an early identification of a
suitable product and that it performs initial testing before signing the contract. This is

followed by customization and a second round of testing before the system is launched.

Analysis and Discussion

The information obtained from organizations is organized according to the software
acquisition life-cycle process model proposed in the IEEE 1062 which includes planning,
contracting, implementation, acceptance and follow-on activities. The activities considered
during information gathering are based on acquisition management and technical activities
associated with the use of COTS products and standards proposed in [11] and on other

269

generic processes of the PORE method that are specifically proposed for requirement
engineering and product selection. Table 1 lists the phases and related activities and state how
they are considered or occur in each organization.

Phases **Organization "A" Organization "B" Organization "C"**

Planning
(business
strategy,
risk analysis,
standards use,
software
requirements)
· Considers immediate
performance needs.
· No risk analysis
· Choice of product is
based on quality and
short schedules.
· Use own standards.
There are no
evaluations of
standards used.
· Requirements are
determined by
beneficiary department.
They are expressed in
different forms by
different departments.
· Considers change in
domain requirements.
· Risks are mainly

defined in terms of old data.

· Products judged on cost and quality.

· Select products from a set of national standards and participate in their development.

· Requirements are determined from outside organization. They are expressed in standardized language used nationally by similar organizations.

· Considers output of business analysis.

· Evaluates business and technical risks.

· Product quality is prime factor in selection.

· Extensive search and evaluation of international standards.

· Requirement are gathered during business analysis and expressed in standard used by business department.

Contracting (vendor and product selection, suitability assessment, contract development)

· Supplier is selected based on personal knowledge of staff. The product is selected after supplier selection.

· No suitability tests conducted.

· Legal advisor part of procurement team from the start of project.

· Supplier and product selected using a tender

system.

· Tests are performed outside the organization by national regulatory bodies.

· Legal advisor is part of the procurement from the start of project.

· Supplier is selected based on business analysis. Products are selected from proposed solutions by internal staff assisted by external consultants.

· Conducts a set of suitability tests set by organization.

· Legal advisor joins team after product selection.

Implementation
(configuration management)

· Configuration starts after contract signing led by vendors and internal technical staff.

· Configuration starts after contract signing led by vendors and internal technical staff.

· Some initial configuration management and testing is done by internal staff prior to contract signing.

Acceptance
(conformance testing)

· System installed by vendor and technical staff, testing performed by internal staff in real environment.

· Training of technical staff is carried out, then system set up and testing (also by national bodies)

before launch.
· Training of technical staff
is carried out before second
round of testing. The system
is then fully installed and
deployed.
Follow-on
(evaluation)
· Projects and
software are evaluated.
· Evaluations are
conducted at national
level.
· Continuous evaluations.

Table 1: Procurement Activities carried out in Organizations surveyed

It can be observed that organization "C" has a more robust process compared with
organizations "A" and "B". This may be due to the fact that "C" has a business analysis
department as part of the IT Section. This department was important during the initiation and
requirements analysis activities and is engaged in a continuous process of assessing the
270
business needs of the organization. When these analyses suggest the need for a software, this
department ensures that the software product is in line the organization's business objectives
and performance goals. This wide view of need/impact assessment of the proposed computer
system serve as a quality assurance mechanism for decisions made with regard to
investments, as well as ensures coverage of needs and compatibility of requirements from
different departments or sections in the organizations.
The tendering procedure used by Organization "B" is considered a strength as it facilitates
identification of suitable products based on tender criteria which reduces the search space.
The organization benefits from being under the judiciary of National Central Bank that
regulates and evaluates processes for government owned banks. However, this can also
prolong the procurement process as decision making is required at senior management level

and becomes focused on product cost more than quality.

In organization "A", project and product evaluation – strength, are conducted at the end of
procurement. These evaluations are used to update information on vendor, user satisfaction,
or to improve procurement processes. More recently (after this study), the organization set up
a business/IT section to be responsible for procurement projects. Another characteristic of
this model is its emphasis on short schedules of procurement projects which may be
necessary in their context because new requirements are introduced at high rates.

Conclusion

The outcome of the work highlighted some areas of improvement to the organizations
procurement processes. For example, decision to procure must be based on business analysis;
use of organizations surveys and market research during product search; and risks to projects
must be identified. A number of COTS assessment attributes such as availability, ease of use,
maturity, vendor support are proposed Bohem in [2] to use in determining the time that
should be spent on product evaluation. Also, teams should include a number of fixed staff
assigned to procurement projects management, and evaluations of product in use and
procurement process must be carried out at end of projects. These are considered as some of
the enabling factors to improvement continuity and process maturity.

The context of the organization was found to significantly influence the procurement
activities carried out and their sequence. For example, the lengthy tendering system employed
by organization "B" is required for government procurement, while short project schedules
was an important criteria for organization "A" where change in requirements and
developments in the domain are faster. Alternatively, in organization "C" time was not a
factor as software is not a fundamental part of their business process.

The paper also identified that language, cost and availability of COTS products for economic

or political reasons, add a further set of complexities to known procurement problems and
cause some organizations to use unstable or "middle-vendors". In these cases, serious
problems of quality and support types are reported to arise. Very few organizations outside
academia are currently using Open Source software (OSS), alone or within their COTS-based
systems. Lowering procurement costs, availability of source code and the freedom to modify
according to need present some of the benefits of this type of COTS. Quality and support are
major concerns in using OSS although this is not the case where OSS has been developing
e.g. operating systems and web servers [12]. Collaborative activities and social networks of
IT personnel working in related organizations in identifying products, selecting vendors,
fixing compatibility problems, is a particularly interesting finding in terms of its potential for
271
an organized local standards development efforts, user community set up, skills transfer,
information sharing, and in that it encourages wider participation in the development of
national standards.

Final remarks and thoughts

More recently in Sudan, specialized government agencies in information and telecommunication technologies moved towards promoting an indigenous software industry
by funding the establishment of research centers in a number of universities as well
government owned ones. The impact of this initiative is yet to be seen however it is worth
noting that the importance of OSS is highlighted. For instance, the newly established
Information Technology Research & Development Center (ITRDC) in the Department of Computer Science at the University of Khartoum, in collaboration with the National
Telecommunication Corporation, has a dedicated OSS research group and all research staff
currently being trained in Linux.

Some of the imperative tasks and challenges that remain to be addressed in the local context
of software procurement and development include: First, developing national standards or
guidelines that can be tailored for use by different sized organizations, to regulate and support
the purchase of products and services. This requires a broader situation analysis similar to the
study reported in this paper, as well as examining other country experiences e.g.
ChileCompra [5]; Second, resolving the paradox of the need for government support to local
(especially growing) industries and how that may infringe global free trade rules. [3] In
addition, developing countries gains from OSS is discussed and demonstrated by nongovernmental
organizations like UNDP and UNCTAD and by researchers worldwide. The
slow uptake of OSS in Africa, behind that of South East Asia and Latin America, can be
understood in the context of inadequate telecommunication infrastructure, but it also begs the
necessity of political will as well as the examination and perpetuation of national interests,
e.g. Peru's Bill for Free Software in Public Administration [9] and the recommendations of
South Africa's National Advisory Council on Innovation [8]. Finally and crucially, centering
the issues of economic and social development into the heart of country software use and
development efforts would foster relevant indigenous industry and boost our critical minds –
to address pressing problems and seek appropriate solutions.

Acknowledgements

REFERENCES

[1] Alves C. and Finkelstein A. *Challenges in COTS Decision-Making: A Goal-Driven Requirements Engineering Perspective*. Proceedings of the Fourteenth International Conference on Software Engineering and Knowledge Engineering, Italy, 2002. pp. Accessed at: http://www.cs.ucl.ac.uk/staff/A.Finkelstein/papers/seke02.pdf

[2] Boehm B. and Port D. *"Risk-Based Strategic Software Design: How Much COTS Evaluation is Enough?"* Proceedings of the Third International Workshop on Economics-Driven Software Engineering Research. Toronto, Canada, 2001. Accessed at: http://www.cs.virginia.edu/~sullivan/edser3/port.pdf

[3] Bohannon, M. *Testimony on China's Regulations on Software Procurement*. At a Hearing
on "Domestic Source Restrictions Threaten Free Trade: What is the Federal Government
Doing to Ensure a Level Playing Field?" May 2005. Accessed at
http://www.siia.net/govt/docs/pub/TestimonyGovtReform_Final_13May2005.pdf
272
[4] Carney, D. Requirements and COTS-Based Systems: A Thorny Question Indeed. *SEI Interactive*, Carnegie Mellon University, June 1999.
[5] ChileCompra (Chilean Procurement and Contracting System) project description. Accessed at: http://www.stockholmchallenge.se/data/2439
[6] IEEE Computer Society. *IEEE Recommended Practice for Software Acquisition.* IEEE Inc. 1998.
[7] Kontio, J. *A COTS Selection Method and Experiences of Its Use*. Proceedings of the 20th
Annual Software Engineering Workshop, Maryland, November 1995.
[8] Open Software Working Group (National Advisory Council on Innovation). *Open Software & Open Standards in South Africa – A Critical Issue for Addressing the Digital
Divide*. January 2002. Accessed at: http://www.naci.org.za/pdfs/oss_v_1_0.pdf
[9] Nuñez, E. D. V. *Letter to Peru General Manager of Microsoft in relation to Bill Number
1609, Free Software in Public Administration*. April 2002. Accessed at: http://bat8.inria.fr/~lang/libre/politique/perou/rescon_en.html
[10] Márcio de Oliveira Barros et. al. *Scenario Oriented Project Management Knowledge Reuse within a Risk Analysis Process*. In Proceedings of the Thirteenth International Conference on Software Engineering & Knowledge Engineering (SEKE'2001), Buenos Aires, Argentina, June 13-15, 2001. pp. 37-44.
[11] Meyers B. C & Oberndorf P. *Managing Software Acquisition: Open Systems and COTS products*. Addison Wesley, 2001. pp. 276-282.
[12] Muffatto M. *Open Source – A Multidisciplinary Approach*. Imperial College Press (London), 2006. pp. 105-109.
[13] Ncube C. and Maiden N.A.M. *PORE: Procurement-Oriented Requirements Engineering Method for the Component-Based Systems Engineering Development Paradigm.* Proceeding of the International Workshop on Component-Based Software Engineering, May 1999. Accessed at: http://www.sei.cmu.edu/pacc/icse99/papers/11/11.pdf
273

Appendix: COTS Procurement Activities of Organizations in Sample
Figure 1: Organization "A" Figure 2: Organization "B" Figure 3: Organization "C"
274

Promoting Virtual Schooling in the environment of the Least Developed Countries using LoColms

Dr. Ngarambe Donart
Kigali Independent University (ULK)

B.P. 2280 Kigali - Rwanda
tel.: +250 08302577;
email: don_ngrambe@yahoo.com

Abstract

We have been witnessing sharp increases in evening classes in many LDCs'
Institutions of
Higher Learning where enthusiastic learners have been converging to very few and
heavily crowded Institutions, sometimes many coming from as far as the ends of
the
country (in the case of Rwanda). In these situations ICT becomes an appropriate
technology, providing a timely solution in this regard. It is becoming both
possible and
easy to establish virtual schooling environments to make learning and teaching
cheaply
and easily accessible from anywhere and at anytime; the movements in search of
schools
and teachers is no longer a must to learning. LoColms (Local College Management
Learning System) is a learning management system that has been designed with the
purpose of making virtual schooling, especially in the LDCs environment, a viable
option
[8]. It is designed to deliver multimedia contents, especially the rich full-
motion video
contents, over the PSTN (which in most of the LDCs is being upgraded to digital
system,
and with sufficient bandwidth by means of ADSL or fiber optical infrastructure
used on
the subscriber loop). The LoColms lowers learning costs by employing the
combination of
Proxy Cache & Multimedia Stream storage Servers and Point-to-Point communication
Protocol (PPP) Technologies. The learners can access the few tertiary
institutions and the
limited expert staff any time and from anywhere, and the use of learning and
teaching
materials is greatly reduced.

1. Introduction

The LDCs represent the poorest and weakest segment of the International community [1].
These countries are characterized by their exposure to a series of constraints such as
limited human, institutional and productive capacity; and lack of access to information and

communication technologies. Adequate tertiary education places a significant role in
national development, which the traditional mode of educational system is not able to
meet in the light of the current demand against the disproportionate population growth
rates and budget constraints in most of the LDCs.
Virtual schooling system can be a feasible and relieving alternative; the enrolment figures
and teaching/learning resources of each institution can virtually expand exponentially, and
the limited resources such as qualified teaching personnel and reference materials can
virtually be shared without a major extra stretch. Generally, the barriers to distance
education in these countries have been the: 1) lack of resources needed for meaningful
development and sustenance of technology-based learning; 2) lack of infrastructures
(which includes information and communication hardware systems) to support modern
technologies in least developed and/or low-technology countries, and; 3) the lack of
recurrent funding necessary to acquire or develop appropriate software and courseware on
a continuous basis, and maintain, service and replace the equipment [2]. This paper
275
discusses a prototype of LoColms, a system designed to support Virtual Schools. The
Virtual Schools in distance education can make the education a "*must for all*" [3],
especially in the LDCs, a realizable dream. One of the major objectives of distance
education is to help widen access to education, raise the quality of education by training
and making resources available to the classrooms, and to bring new methods and
approaches into schools, [4].

2. The LoColms Based Virtual Schools
2.1 The Concept of Virtual Schools

A Virtual Organization is defined as a "dynamic collection of individuals and institutions
which are required to share resources to achieve certain goals" [5] and as "a temporary or

permanent coalition of geographically dispersed individuals, groups, organizational units
or entire organizations that pool resources, capabilities and information to achieve
common objectives" [6].
As pointed out [7] the related terms "virtual", "virtually" and "virtuality" imply that
something exists having a potential effect but this something is not tangible. In classical
organizations the boundaries are clearly defined, while virtual organizations are
characterized by fuzzy boundaries, flexible structure and the ability to include new
partners as the need arises. In a nutshell, virtuality can be defined as a temporary or
permanent coalition of geographically dispersed individuals, groups, organizational units
or entire organizations that pool resources, capabilities and information to achieve
common objectives, while decisively relying on information technology (IT). A virtual
school is also extended to cover different alternatives of symbiosis with physical school. A
virtual school can work as a virtual extension of ordinary school or classroom activity. The
concept of virtual school does not emphasize teaching; it focuses on individualism and the
independent initiative to study. The Virtual Schools concept allows a great deal of
flexibility for learners and educators.

2.2 LoColms General Architecture

The LoColms relies solely on the local resources, namely the local universities and the
local telecommunication facilities, a characteristic that makes it highly sustainable. The
rationale is to utilize what exists locally; every country has a well-established PSTN
infrastructure, and presumably that is already being digitally upgraded (for the ease of data
communication).
The key technologies supporting the LoColms virtual schools comprise **PSTN**, **PPP,** and **ProCa**. The choice of the PSTN eliminates the duplication of communication
networks (especially Internet, a packet-switched network, that has been the main

infrastructure for the Web), or dedicated private virtual networks (PVN) usually required
in similar situations.and the choice to utilize the local educational institutions (LEI) is to
empower the local educational institutions. The PPP is used to provide a direct TCP/IP
link between the Local Educational Institutions (LEIs) and the Virtual School Centers
(VSCs), while the ProCas are to minimize communication traffic and costs. The choice of
the optical fiber cable or Digital Subscriber Link (xDSL) is to provide a broadband
environment over the ordinary telephone subscriber lines. The architecture is as in fig. 1.
The Video-Streaming technology is also employed to solve the downloading time. The
basic idea of video streaming is to split the video into parts, transmit these parts in
succession, and enable the receiver to decode and playback the video as these parts are
received without having to wait for the entire video to be delivered. Video streaming
allows the students to start studying even before the downloading has completed with a
short delay (usually on the order of 5-15 seconds) between the start of delivery and the
276
beginning of playback. For most users of the web (56k), streaming video appears as a
small video window, usually 160x120 pixels in size and 5-15 frames per second. For those
with intermediate Internet connections (DSL, Cable), that picture might be 320x240 pixels
and 15 frames per second. Those on institutional networks (T1, T3) are capable of viewing
640x480; full motion video. However, this is not required after the contents have been
saved on the ProCa. They are downloaded locally and played from the ProCa server.

Fig.1: LoColms Architecture
ADSL, ISDN or Optical Fiber
LEI LAN
Virtual School Center (VSC)
Proxy Cache
Check ProCa
contents

Shared Contents

**Redundant
topic units
discard from**
register
Topic units register
Study 1 Study2 StudyN
No contents
Login
DVR

LOCOLMS Server

(Download study
contents):
University LOCOLMS database:
(check payment) Study contents repository

Multimedia theaters
Digital-Audio Recorder Digital-Audio Recorder Digital-Audio Recorder
LOCOLMS Multimedia Stre
Verify account
Record class session
Update units register

PPP

link to

the

Locol

277

2.3 LoColms Description

The LoColms, an asynchronous interactive educational system, is built on the Java
technology, and is based on the Client/Server paradigm. The objective of LoColms
Application is to provide both a sustainable and an economical solution, suitable
for the
educational situation in the LDCs. Its economicability comes from the fact that
it is
supported by locally existing resources. Its local feature comes from the fact
all the
subscribing parties, namely the local universities offering the courses, the
private
companies operating the *LoColms based virtual school* study centers, the local
telecommunication firms, and the remote students are all local resources and
operating
purely on business terms. On LoColms the same lecturers can serve both the
residential
and the remotely learning students with a minimum extra effort.
The LoColms deployed over PSTN, the VSCs and the LEI LANs are each linked
to the PSTN central office by bandwidth of either 128 kbps (using ISDNs) or
higher (using
ADSL, or Optic fiber technologies) and the PPP technology, a link layer protocol
to
transport datagrams across a serial point-to-point links. The system supports
video

recorded class sessions that were saved in the *LoColms* servers, to be downloaded by
remotely learning students in VSCs over broadband links such as SONET/SDH on the
PSTN backbone and over ISDN or xDSL over subscriber links the; the learners on the
LoColms are organized in VSCs in order to provide sufficient bandwidth to the VSCs. On
making a PPP dialup connection to the respective LEIs, the users of the system must first
go through the login process for authentication, and the server keeps the record of the
number of times the online learner turned up for classes. At the client side the remote
learner is guided through the information about the college, the level, the course (or
major), and subject of study. First, the system must check whether the contents have not
been previously downloaded, because the study resources downloaded by previous
learners are temporarily saved in the VSC's ProCa Server for the subsequent learners,
until they are replaced by successive course packages; either by automatic *prefetch* or by
more frequently shared resources, according to the *Course Sequencing Prerequisites* and
Completion Requirements. It is highly hoped that many courses would be shared, although
different remote learners may be studying different Assignment Units (*Aus*) of a same
course, according to the Course *Structure Format* (CSF) of each course. It is highly hoped
that many courses would be shared, although different remote learners may be studying
different Assignment Units (*Aus*) of a same course, according to the Course *Structure
Format* (CSF) of each course.
The Course Structure Format (CSF) and Course "Packaging" in the LoColms is
emulated in the ProCa. It requires contents of 45 minutes block units of a topic plus 15
minutes of *Assignment Unit, (au) exercise* of the subjects being studied at a time. The
learners from the VSCs will be served with Topic Assignment Units (Tau) according to

the prerequisites and completionReq procedure, (Tau₁&Tau₂&...&Tauₓ); studied sequentially

according to the sequence these units were taught at the LEI with an after Tau exercises to

mark the completion of the Tau if attempted after a period of 60 minutes. A finished Tau

is recorded in the LoColms. The LoColms application screens (figures. 2 and 3).

278

Fig. 2: selecting study content screens

279

Fig.3: downloaded content screen

2.4 ProCa storage optimisation

To optimize the ProCa storage capacity, the system will only be concerned with the contents regardless of the LEI or colleges the contents were obtained from. In other

words, it doesn't matter from which university the contents were downloaded, the learners

studying with different universities but studying the same courses will have to share the

contents. This is illustrated as follows. Since the basic purpose of caches is to encourage

sharing of contents, consider a subject, SubjectA (SA), having several *Tau*s:

$$SA = \{Tau_1, Tau_2, ---, Tau_N\} \text{ --} -(1)$$

For, a Tau_j, an Na_i (number of students sharing a copy). The bigger the Na_i for Tau_j, the

fewer the copies of contents residing on the ProCa. By definition thus;

$$(Tau_j) = Na_i = 1 \text{ } (unshared\ contents)$$

$$Na_i > 1 \text{ } (shared\ contents) \text{ --}(2)$$

$$Na_i = 0 \text{ } (no\ contents\ in\ cache)$$

The overall contents in the ProCa would be;

$$\Sigma Tau_j = \Sigma (Na_i > 1) + \Sigma (Na_i = 1) \text{ --}(3)$$

280

Since the $\Sigma (Na_i = 1)$ contents would be removed from the ProCa, the net content will

approximately be;

$$\Sigma Tau_j \approx \Sigma (Na_i > 1) \text{ --} -(4)$$

For instance, if the video contents of say 45MB files were arranged in units of 45

minutes consisting and the end text file, *Tau* exercises, the proxy cache storage capacity

of, say, 100 GB used to the full capacity would support about 2000 units, (or 2000
different subject topics hosted) on the ProCa. In other words, ProCa would support 2000
students simultaneously studying from a single VSC LAN. If the size of one LAN had,
say, 20 PCs, and all the 20 computers were busy throughout the day (from 8.00 to 22:00
hours), it would accommodate nearly 300 learners; that is 1/6 of the capacity or 13 GB per
day, for the worst-case scenario.
According to the Zipf's law, the popularity of a course will determine the
frequency of sharing the content. Since the number of LEIs and the volume of the
expected courses offered on line would also be small among the LDCs, we can expect a
very high hit ratio for most of the popular SA_i in the ProCa.

3. Conclusion

In this paper we discussed the prototype of the Local College Learning
Management System (LoColms) we are using to support virtual schooling, a system used
to provide a sustainable and economical solution suitable for educational situation in the
LDCs. The application is supported by traditional communication technology, the public
switching telephone network system (PSTN) formerly regarded a voice communication
system, which already exists in all of the LDC countries to avoid the costs that would be
involved in deploying packet switched networks or dedicated private virtual networks
(PVN) usually required in similar situations, and is aimed at improving the traditional
form of education through empowering the local educational institutions. The work
discussed is an innovation, whereby different technologies are combined to provide,
cheaply, an easy access to higher education in the least developed countries. By this
approach a lot can be achieved: 1) the virtual infrastructure would be economically
established and with ease; 2) individual colleges' enrollment would, virtually, increase; 3)
the local resources would be helped to develop; 4) the e-learning educational system that
is sustainable.

We hope that this work will stimulate further research in appropriate technologies,
especially the web-based ones, that will be more applicable in the LDCs' situations, for
the interest of education in the LDCs in particular and any other socio-economic aspects in
an effort to bridge the digital divide in general, relying on the locally available resources
with an aim of strengthening them. Although the mastery of IT related technologies should
become a priority, it shouldn't be a precondition for these countries to engage in the
technology-based education systems, especially if there already exists a minimum technological capacity with which to start.
We are planning to improve the application by including an online examinations
aspect, where the set of examination sessions would be randomly selected for candidates
in such a way that no two papers would have same questions, to make the application
more or less a complete educational application.
281

4. Reference

[1] The Third United Nations Conference on the Least Developed Countries Brussels,
UNCOLDC, (2001)
[2] Gundani,& Govinda Shrestha, "DISTANCE EDUCATION IN DEVELOPING COUNTRIES",http://www.undp.org/info21/public/distance/pb-dis.html#up, (1997)
[3] General Assembly of the United Nations proclaimed this Universal Declaration of
Human Rights (Article 26.1), (1948),
http://www.historyoftheuniverse.com/udhr.html.
[4] The Third United Nations Conference on the Least Developed Countries, Brussels,
(2001)
[5] Tella, S., "Virtual School in a Networking Learning Environment." University of
Helsinki. Lahti Research and Training Centre, 146-176, (1995).
[6] Illich, I. "Towards a School-Free Society." Helsinki: Otava, (1972).
[7] Tiffin, J. & Rajasingham, L. 1995. In search of the virtual class: Education in an
information society. London: Routledge
[8] Ngarambe D., Prof. Dr. Pan Yunhe, Prof. Den Ren, (2003), "LoColms: an

innovative approach of enhancing traditional classroom form of education by promoting web-based distance learning in the poorer countries". Journal of Zhejiang University, SCIENCE, Vol. 4, No. 6, Nov – Dec. 2003

282

SUCCESS AND FAILURE FACTORS OF MANAGEMENT INFORMATION SYSTEMS IN THE LIVESTOCK INDUSTRY OF DEVELOPING COUNTRIES.

Mpofu I. Umutara Polytechnic University, Faculty of Veterinary Medicine, P.O. Box 57

Nyagatare Rwanda). Fax (250) 565191, E-mail: impofu66@yahoo.com

Key Words: Livestock, MIS, Success, Failure

Abstract

Management Information Systems (MIS) enable commerce and industry to collate and manipulate their data in a methodical manner and use the records, facts and figures to
generate quality intelligent information. Information generated is knowledge which is used
in making timely decisions. There is an increase in the interest of MIS in the Agro-
Industry, especially the livestock production and animal products processing operations.
MIS projects in the Livestock Industry are quite different from each other from the
technology standpoint, but we can reach similar conclusions about the factors that enable
each of them to succeed in the implementation process and in putting the systems into
operation. This paper seeks to appraise the importance of MIS in the Livestock Industry by
elucidating real factors of success and failure that developing nations needs to pay
attention to if livestock is to play a bigger role in economic development. The paper
recognizes that some key factors in the success and failure of any implementation MIS
project have hinges more on telecommunications infrastructure. This article therefore
supports the idea that it is important to have the right policies, then infrastructure and
have clear processes in place for data collection, processing and generation of quality
information.

1.0 Introduction

Management Information Systems in the livestock industry means the employment
of a record systems that create databases from which information can be
retrieved,
processed, batch or real time, to generate quality information that is usable in
decision
making. MIS in the livestock system can be applied in the following areas
(departments):
1. Animal production and management (milk, meat, eggs, wool),
2. Nutrition (Feed analysis, fabrication, and feeding),
3. Animal Herd Health (epidemiology, prevention and treatment),
4. Breeding and genetics (artificial insemination, multiple ovulation and embryo
transfer,
gene banks),
5. Animal products processing and
6. Marketing (on the hoof:- electronic auction system), on the hook (meat grading
schemes).
Many experts have talked of sustainable livestock production, integrated
croplivestock
systems and organic livestock farming methods for many years and yet their real
impact is very small especially in the developed world. Information is power,
they say but
are we distributing it enough and using it to make decisions! If developing
countries can
take the known, good MIS technologies to another level of magnitude then they can
contribute significantly to the supply of 300 million tones of meat (by the year
2020) from
non-industrial systems that the world so need [1]. It is a major challenge that
relies on the
success or failure of the promotion, implementation, and sustenance of an MIS in
each
country and within regional groupings like Southern African Development Community
283
(SADC), Common Market for East and Southern Africa (COMESA), Economic
Community of West African States (ECOWAS), to mention a few.
2.0 Critical Success or failure factors of a Livestock MIS
2.1 MIS Livestock Policy
The first factor is the presence of a policy statement within countries spelling
out
the importance hence the need for the implementation of a Livestock centered MIS.
Policies with set milestones are critical but there must be a system in place to
monitor and
evaluate progress, benefits, difficulties, experiences, effectiveness and
efficiency of the

system. This will allow either change of course or fine tuning where necessary. At the
policy, producer and processor level, the provision of safe and wholesome animal products
as human food must be recognized as the cornerstone to sustainable livestock and product
development. At the end of the day, policy decisions must be made. At least these policies
should remove the obstacles for small producers and, in some cases, restrain the big
companies. Policies directly promoting MIS in the livestock industry in the developing
countries are not explicitly pronounced. One can only make inferences from the national
livestock strategies which consistently aim to commercialize animal production.
Commercialization of livestock production succeeds if relevant and current information is
used in decision making. For the developing countries, this can only be possible through
facilitation backed by specific policy statement that encourages a deliberate attempt to
promote distribution and hence intelligent use of data and information.

2.2 The central role of Telecommunications Infrastructure

One problem that directly hinders success or cause the failure of an MIS in the
livestock sector is infrastructure. This is in terms of telecommunication infrastructure to
enable transfer of data and information via telephones (fixed and or mobile), internet or
VOIP. How can small producers (who are usually the ones applying the more sustainable
technologies and integration of farming activities) have access to the livestock information
market? The answer probably lies in governments developing elaborate communications
technology infrastructure. A case in point is the NEPAD initiative of laying an optical
fiber from Cape to Cairo by committing member countries to an ICT protocol. This will
allow livestock farmers to participate in telemarketing, and telecommuting. A case in point
is the mobile phone, being used as a village communication tool in Bangladesh (Grameen

Bank) and Venezuela, which has had a positive impact on marketing from small producers
[2].
A functioning telecommunications infrastructure allows all classes of livestock farmers (smallholder farmers, large scale commercial farmers, and specialist animal
breeders), agro dealers, middle men, veterinarians and other animal science practitioners
to access information about, animal breeds, feeds, veterinary drugs and medicines. There
is also a need and demand for low cost and simple processing technologies for livestock
products whose supply and demand can be assessed and accessed for the benefit of livestock resource development.
In many situations, the middle-men or traders take the lion's share of the profit in
the livestock industry because they have the means, the knowledge and the access to the
consumer market. Emphasis needs to be given to the development of an inclusive Livestock MIS that collects data and feed back information to the small-scale and village284
level livestock cooperatives, livestock products processors, including information on
equipment, training, distributions network and marketing channels.
Availability of information on suitable equipment, which can make small-scale processing competitive, can easily make livestock development advance significantly.
There are examples on the African continent for example there is a successful project in
Uganda to develop value-added meat products by village women and young people. An information system has been put in place to equip the same group of farmers, promoting a
method of milk preservation (the Lactoperoxidase System or LPS) which keeps milk fresh
for 7-8 hours longer [3]. The widespread adoption of the low-cost system stems from a
sustained inflow of technical information. This means increased income for farmers who
rely on livestock, enabling them to sell their fresh milk beyond the village and supply the
growing urban centers. The farmers use the information about supply from primary production levels as well as demand trends from the market.

Sustained communication infrastructure has recently helped to prop up activities in
meat preservation in Ghana [4]. This has resulted in the development of highly effective
solar meat drying equipment.

Fulfillment of consumer demand is not only quantitative but also qualitative.
Livestock producers need timely systematic information for example that livestock
products must be produced from disease-free animals and under hygienic conditions. They
must have readily available information about the question on the use of additives that
'improve' production but are unacceptable to the consumer if they are to create
opportunities for export markets.

The best way to stimulate livestock production is to allow producers easy access to
information on good return for their products. This provides real incentive for livestock
production at farm level as farmers can make correct decisions on adjusting the scale of
their operations.

There is progress in some places, like Bangladesh where women farmers have been
assisted with both microcredit and training. There has also been effective training of
technicians in farm and village work and information technologies. A Livestock MIS that
combine new communications methods and greater focus on village-level action seems to
be the only way to expand and sustain livestock production.

There is a global 'knowledge base' that FAO is developing (through its World
Agricultural Information Centre (WAICENT)) which can provide solutions to production,
health and processing so as to enable small producers worldwide to meet food security
challenges of the future [5]. This must get through the system, via the technicians, to the
village level and telecommunications infrastructure holds the key to the success or failure
of these endeavors.

As production and consumption of meat and other animal products increase, the
problems will become even more pressing and acute making the need for improved
communications infrastructure more critical. Individual livestock farmers and livestock

cooperatives can not develop this kind of infrastructure due to the huge capital outlay
needed. As a result it is up the national governments to create an enabling environment by
making necessary investments in telecommunications now not later.
285

2.3. Examples of Information Communication Technologies (ICT) that have a potential for working under Developing Country constraints

In the crop agricultural industry, there has been adoption of commodity indexing system in countries like South Africa through Agricultural Marketing authorities. This
information exchange system captures data on supply, demand and price trends. It has
helped small holder farmers to take part in formal markets to their advantage. If such a
system is put in place in the livestock sector, it will make a big difference in allowing
farmers to participate in competitive market. The advantage is significant as the cattle
farmers can be able to cut off middlemen who are currently exploiting them.
Another tool that has been adopted completely by commercial farmers in South
Africa, Zimbabwe, Botswana, Namibia and Kenya is the LIVESTOCK
IDENTIFICATION SCHEME. In this scheme, only beef animals that are registered by a
national trust qualify for exports to European markets. The scheme captures a lot of data
from producers and feed back useful information which help the farmers to improve their
production levels. Wide adoption of such a scheme by smallholder farmers who have the
majority of beef animals can place them into the main stream of their national economies
and contribute meaningfully to wealth creation.
Dairy herd management data capture systems used in the developed world presents
an opportunity to improve milk production so as to match demand and supply. The scheme
exists only for big commercial milk producers in some developing countries and it is
possible to extend this to small scale dairy producers.
Computer aided feed formulation and computer based record keeping at the
production level has a potential of modernizing livestock production in the developing
countries. Use of correct and accurate data is critical for decision making. Individual

farmers may find these packages expensive, but there is an opportunity for government

extension staff to do it on the behalf of the farmers. Most extension staff in the developing

countries are computer literate and they can easily be organized into information agents.

3.0 Requirements for successful Livestock MIS

3.1 Empowered and enabled livestock-keepers

In order to achieve buy-in by the users of information of a Livestock MIS and achieve pro-poor economic growth, it is imperative that resource-poor livestock-keepers

are involved right from the start of any livestock MIS intervention. Large scale farmers

operate from a business stand point and usually buy-in easily due to the desire to remain

profitable. But for the majority of the smallholder livestock farmers, resources must be

allocated to identifying them, targeting them and planning, with them, appropriate

interventions. There is no MIS system that is applicable to all levels of information

consumers. So targeting and wealth ranking is always necessary so that relevant information channeling creates effective communication. In each country or regional

grouping, there is need to first obtain information on where resource poor livestockkeepers

live, i.e. at province and district level [6], and on their systems of production. This

information helps direct investment into the most appropriate geographical locations. Care

should be taken in the process so that the local elite do not bias decisions at the expense of

poorer farmers.

The expectations are that a local Livestock MIS facilitates all the activities in livestock farming e.g. herd management, feed management, inventory management, herd

286

breeding and genetics, interaction with centralized feed centers, pasture management and

fattening feedlots. A database is created that would provide the national herd management

services with information on management of each herd as a profit center, cost accounting

and economic analysis and the economic assessment of the animal husbandry aspects,
knowledge mining from the data sets, logical deviations, algorithms,, reports, knowledge
feedback from researchers and scientists. This system also allows for connectivity to all
providers and recipients of services, automatic report generation and dissemination.

3.2 Participatory Livestock MIS planning and management

The development of a Livestock MIS must make it clear to all stakeholders and
address the fundamental questions about the situation to be improved and what constitutes
an improvement. It may be necessary that the existing situation is assessed by livestockkeepers
themselves and that they actively participate in defining their problems and
developing realistic solutions [7]. For long-term sustainability of any Livestock MIS,
stakeholders must see clearly into the future, what roles each one of them individually or
collectively will perform, as well as the roles of government and the private sector. This is
critical for the farmers to understand because they will sustain the Livestock MIS with
relevant data on say livestock numbers, breeds and breed structure, disease morbidity, take
off rate etc. which the government and private sector will use to make decisions that
benefits all.

3.3 Role and Potential of Farmer Organizations and Groups

It has been proved the world over that farmers acting as a group are stronger than
when they act as individuals. Groups, commodity associations and cooperatives can serve
a variety of purposes including, mutual support and encouragement through comfort in
numbers and sharing of experiences and novel ideas, provision of non-formal microfinance
(through savings and credit schemes), animal breeding services (e.g. sire services,
Artificial Insemination (AI), registration, livestock identification schemes), veterinary
services (e.g. vaccinations, clinical procedures, diagnostic services, herd health

management calendars), feed and forage analysis, feed formulation, cost-effective input

supply through economies of scale (e.g. bulk procurement of feed, drugs, forage planting

material), technical support and training, product collection, bulking and processing (e.g.

bulk milk collection), improve access to markets, increase bargaining power and effective

lobbying. So, how organized the farmers and animal products processors are, has a huge

bearing on the success or failure of a Livestock MIS. For example, the Israel Cattle

Breeders Association (ICBA) represents all dairy cattle farmers in Israel. For the past 8

decades the organization has been the sole representative of all milk producers in the

country, taking care of all their professional needs and sustaining a vibrant and modern

industry [8]. The organization supplies essential assistance to its members and the satellite

organizations connected (through a Livestock MIS) to the industry. As a representative

organization the ICBA is involved in national milk pricing and milk production quota

policy, milk quality assurance, information dissemination, bull certification and more [8].

This Dairy Management Information System (MIS) was developed by the Israeli Cattle

Breeders Association (ICBA) to oversee the professional management of the National

Dairy Herd. Its main function is to give the individual and national herd managers updated

relevant and quality information regarding all aspects of dairy activity, addressing all

aspects of dairy farming. This Livestock MIS has been successful because it represents a

concept of optimizing each individual cow's performance as the basis for dairy

287

management rather than using "averages". This concept in turn is aggregated to practicing

dairy herd management at the local, regional and national levels. Infrastructure on

Information and Communication Technologies (ICT) are critical success factors enabling
implementation and sustenance of this concept.

3.4 Marketing Livestock MIS

It is important to end this paper by reviewing success factors linked to the process
of innovation especially in the introduction of an electronic auction system for livestock.
While this might suit big livestock producers, small producers are part of it as they often
constitute the catchment area of most animals that are taken for fattening. The growth and
development of the system takes a number of years to implement and requires substantial
seed capital. Models of the innovation process implemented in the developed world
provide useful and powerful frameworks for the developing countries to emulate were
possible, resources and technical expertise allowing. The growth of 'trust' in the system
(where it has been implemented) was found to be an important additional factor in
determining successful innovation [9]. Since electronic auctioning is high-tech,
appropriateness, defined in terms of the ability of the system to benefit the stakeholders, is
used to determine the competitive advantage over simpler marketing channels and hence
success. The gains accrued to stakeholders and the long-term changes in the
appropriateness have been found elsewhere to determine the long-run sustainability of this
kind of Livestock MIS.

4.0 Conclusion

The main support that the Livestock MIS provides is data updating and refinement
– mainly correcting current management programming issues. This exposes the users of
information so generated by the system to new management applications and supports the
integration of the various animal husbandry systems involved in all aspects of the
livestock industry. The critical point is that for the Livestock MIS to succeed, it must be
adopted, creating in the process, capabilities among information users so that they make
decisions that are compatible with the expected animal husbandry and market

developments over time. Apart from telecommunication infrastructure, it is necessary to
emphasize the importance of good leadership and putting in place enabling policies. It is
also vital to recognize the importance of stakeholder involvement to insure that participants will make a good transition from implementation to maintenance. Livestock
businesses are spread out in different regions within a country and it is always important
for constant contact hence networking technologies are a big challenge to the success of
Livestock MIS.

5.0 REFERENCES

[1] FAO. Animal Production and Health Division. Editor- Andrew Speedy. *World Animal Review,* 1999.

[2] Waltham, N. (1999). Experiences in the management and exchange of electronic information for sustainable agriculture. *Livestock Research for Rural Development.* **11** (1), p. 1-18.

[3] FAO. (2000). Proceedings of the Second Annual Meeting of the Lactoperoxidase Group of Experts. *Food and Agriculture Organization of the United Nations,* Rome.

[4] Heinz, G. (1994). Preservation and processing technologies to improve availability and safety of meat and meat products in developing countries. *Meat and Dairy Service, Animal Production and Health Division, FAO*, Rome, Italy. 288

[5] Ilboudo, J.P. (2001). FAO's Experience in the Area of Rural Radio, Including Information and Communication Technologies Servicing Rural Radio: New Contents, New Partnerships. *First International Workshop on Farm Radio Broadcasting*, Rome, Italy. 12-22 February 2001.

[6] Thornton, P.K., Jones, P.G., Owiyo, T.M., Kruska, R.L., Herrero, M., Kristjanson, P., Notenbaert, A.,Bekele, N. and Omolo, A. (2006). *Mapping climate vulnerability and poverty in Africa. International Livestock Research Institute*, Nairobi, Kenya.

[7] Peacock, C. (2003). Goats-A pathway out of poverty. *Small Ruminant Research.* **60** (1), 179 - 186.

[8] NOA. (2007). A Management Information System for the National Dairy and Beef Herds, (An Israeli MIS Development case study), Ephraim Ezra,

www.departments.agri.huji.ac.il/economics.

[9] Spinardi, G., Graham, I. & Williams R. (1998). "Electronic Commerce and Interorganisational

Restructuring: Barriers to the Use of Information Technology for BPR", in

Garcia, C. E. & Sanz-Mendez, L. (eds). *Management and Technology, COST A3, European*

Commission, Brussels, p. 472 - 484.

289

A Model for Turning African Stories into Creative Content

Suraphel S. [1] and Bello S. [2]

Beta Bahil, P.O. Box 31511, Alexandria, Va., 22310, Email: suraphels@betabahil.com

Rogue Venture Labs, 3404 Coval Circle Atlanta, GA 30349, Email: siddiqtb@gmail.com

Key Words: New Media, Creative Economy, Intellectual Property, Crowd-Sourcing

Abstract

Producers and consumers interested in content reflecting various manifestations of the

African world face a problem. For the producers, the pain is finding an economically

sustainable way to create work, such as music and film that present various narratives of

the global African community. The hurdles of traditional production, marketing and

distribution systems often prevent good storytellers from bringing their visions to a wide

audience. If their stories do reach a wide audience, it is usually at a severe trade-off for

equity in the ownership of the story. Thus, the content creator must either sell to a small

audience and risk not recouping their expense or sell to larger audiences and never

receive a sustainable share of the income. In either scenario the storyteller is left without

the financial resources which could have later assisted them to become financially

independent.

This paper evaluates examples of new technologies that have created an opportunity for

low cost high quality content production. Specifically, it examines strategies for

organizing the appropriate human and technical resources to leverage present and

emerging Information and Communication Technology (ICT) infrastructure to foster new

ventures that commercialize Africa's abundant stories. The paper then addresses, from a

market perspective, the technological resources currently available, or within reach, of

most African countries to begin creating, packaging and exporting its stories. This new

export is sustainable and can lead to both job creation and economic growth.

Introduction

The African storytelling tradition and its many forms of artistic expression have been a critical aspect of communication within the African tradition. From the composition of music to the performance of dances, African artistic expression conveys messages of identity, history and shared value systems that have sustained cultures throughout dislocation and "development". Professor Harold Scheub once wrote "The African oral tradition distills the essences of human experiences, shaping them into [re]memorable, readily retrievable images of broad applicability with an extraordinary potential for eliciting emotional response." [10] People continue to seek out and connect with African cultural expression. In many cases producers as well as consumers must often overcome resource and product scarcity along with higher costs in order to fulfill that need. This is the case due to both micro and macro issues with regard to content creation, distribution and marketing on the continent and abroad. The emergence and growth of ICT on the continent[11] and abroad has reduced some of these obstacles. The creation process is now cheaper for producers who have improved access to global

10Scheub H. A Review of African Oral Traditions and Literature. *African Studies Review*, vol. 28, 2/3, June/September 1985.

11 Gitta S., and Ikoja-Odongo J.R. The Impact of Cybercafés on Information Services in Uganda. *First Monday*, http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1043

290

audiences[12].

There are other resources that discuss policy issues in depth, namely the recently published UN Report on the Creative Economy (UNRCE). This paper however, focuses

on the market and builds a case for a new digital media marketplace. A marketplace that
taps into the latent demand and nascent commercial potential of content built on the
multitude of identities and stories of the African experience. Further, differing from
the UNRCE that uses the linear United Nation's(UN) classification[13] of creative
industries, we propose a model that allows storytellers to convert the vast stores of
cultural IP (Intellectual Property) into what the UN classifies as functional creations.
Taking into account the various strata of African societies, the writers considered
both those with and without the means of organizing the necessary resources for low cost
content creation. Given the level of constraints faced by the vast majority of African
storytellers a market intermediary is required to:
1. Define a set of resource independent guidelines that convert ideas into fundable
projects.
2. Provide an open marketplace where micro-producer and niche content consumer can
exchange value.
3. Provide a compendium of resources that assist in the above two items and can be
accessed at little or no cost.

Examples of Culturally Compelling Content
In this section we outline a number of examples of culturally compelling content
that can be mined for heuristics around building niche content accessible to mass
audiences. Recurring themes in the content offerings we examined where not related to
subjective visions of quality or technical sophistication but rather identity and

12 UNCTAD E-Commerce and Development Report 2004 has an excellent discussion of ICT as a growth engine for developing countries (see chapter 3, "Creative industries and digital and Internet technologies: The case of music", pp.
61-94). The report is available at: http://www.unctad.org/ecommerce/ecommerce_en/edr04_en.htm.
13 UNCTAD and the UNDP Special Unit for South-South Cooperation. The Challenge of Assessing the Creative Economy Towards Informed Policy-making, UN Creative Economy Report 2008, page 38. 2008.

291
accessibility.

Identity
Identity in this context is used as a showcasing of ones self, or a reflecting of ones

self. The success of Bollywood and Nollywood film industries reflect this in today's media
landscape. They have shown that local and Diaspora audiences, if given the choice, will
consume media products that are reflective of their cultural identity. Bollywood, currently
the largest film making industry in the world, has not only been able to win over audiences
in South Asia but also reaches the South Asian Diaspora worldwide and attracts many
non-Asians. The same can be said about Nollywood's products that are now favorites of
Nigerians and non-Nigerians across the African continent and in the Caribbean.
One of the ultimate examples of the concept of differentiation or content diversity
is the Hip Hop musical form. An art form born in the New York in the early 70's[14], Hip
Hop has provided a platform for young people worldwide to both represent their local
conditions, styles, and realities through mc'ing, dancing, dj'ing, beat boxing and street art.
Through the songs of Run-DMC, NAS, Notorious B.I.G. and many others, youth across
the world learned about and sometimes emulated life in the Queensbridge and Brooklyn
boroughs of New York City. Despite its current image in certain quarters, Hip-hop is one
of the best modern examples of low-cost cultural content crossing boarders to globally
showcase one's identity.

Differentiation/Diversity – Showcasing Individuality Amongst Global Identity
To stand out in a world where media and content crowd your television, computer,
and personal space one has to be different. The continent has a natural advantage in
gaining attention in the content marketplace with settings and sounds that are not widely
known by global audiences. In addition, though certain plots and themes may be universal,
the potency of the African storytelling tradition is as unique as it is old.
Diversity marks one cultural resource available to relate Africa's contemporary
identity. This diversity is present on tribal and regional levels and is further extended by
the divergent experiences of urban and rural populations. The urban/rural iteration of the

identity provides an opportunity to access perspectives that incorporate traditional
messages with modern realities. Bollywood's movies, though not always reflective of
India's diverse population, has successfully crafted its unique music, dance, and visual
preferences into cultural artifacts that have won over audiences Indian and Non-Indian
alike. Delivering the storyline amongst traditional, modern and magical settings, as well as
in a unique format, Bollywood created fans with an affinity for the individual movies, the
culture, and the country.

Accessibility

Once the content has been identified, the next step is formatting the presentation
such that it can be consumed by an audience. Accessibility thus means leveraging
available digital storytelling methods and tools to reach the widest niche audience
possible. This includes the language in which it is presented and the medium in which the
audience receives the content.

Language – So We Speak Different Languages, Subtitle It!

Though most in the developing world have been consuming foreign language
content without translation, through both American and South Asian Films, there has been

14 Chang, J. *Can't Stop Won't Stop: A History of the Hip-Hop Generation*, Macmillan. 2005.

292

increasing demand for local content that can be consumed by those who may not speak the
foreign nor official state language. Today's technology allows for many ways of either
dubbing or subtitling content to make it accessible to both audiences who speak different
languages or are hearing impaired.

South Africa, with 11 official languages and a constitution that grants equal status
to all of them, has shown how content can be brought to the masses by considering multilingual
formatting[15]. On soap operas, the audience would find characters
speaking IsiZulu, English and Afrikaans on the same show. Subtitles are then used to

translate, for example, the IsiZulu and Afrikaans portion of the scripts into English. Thus,
allowing for writers to create in the natural language of their imagination, yet still making
it available to an English-speaking audience that could be in Ghana or Canada.
Medium – Content Designed for the Web and Mobile
ICT has revolutionized our world in terms of how and where we obtain our
entertainment and content. Therefore, content producers must consider these new
mechanisms in which the content is obtained. Further, great strides have been made by the
availability of fiber-optic cables and the 3_{rd} generation mobile networks that provide for
streams of video, music and other rich media to be distributed and accessible.
Producers must now envisage these new tools when creating their work. ICT has
empowered both the audience in terms of choice, and producers in terms of access. With
animation, for example, one could envision a new cartoon based on a traditional story
being leveraged to create a website for further engagement with the kids, ringtone, and
picture to be downloaded onto one's mobile handset. Each of these extensions from the
original intellectual property provides for additional revenue streams that were not present
in the past.[16]
As we've seen crafting culturally compelling content from the range of stories available
across the diverse regions of the African continent are possible by embracing what is
different about each storyteller and understanding the specific attributes and opportunities
present in the mediums used to get that content out to wider audience.

A Crowd-Powered Content Model
In his book *Wisdom of Crowds*, James Surowiecki[17] argues that a large grouping
of diverse, independent and decentralized people will often make better predictions and
decisions than experts. This insight is a central theme of many of the Web 2.0[18]
technologies that have wreaked turmoil on the business model of the traditional media
industries (music, film, television and newspapers). There are many crowd-powered
services that aggregate the intellectual, economic or technological might of individuals to

create new products, markets, services and innovations. Sites such
as Kiva.org, Digg.com, Fundable.com and Spot.Us all utilize a crowd-powered model to
achieve their goals. It is this model that we propose to leverage in order to overcome the
social, technological and policy impediments to a thriving digital media economy for

15 See http://www.southafrica.info/about/people/language.htm for further information
16 See *http://www.cartoonnetworkshop.com/, http://mobile2.cartoonnetwork.com/*, and *http://www.aniboom.com/* for case example of animation IP leveraged for new revenue streams.
17 Surowiecki J. The Wisdom of Crowds, New York Random House. 2004.
18 Web 2.0 is an evolving term used to describe a suite of tools, sites and services built around the central tenants of
openness, peering, sharing and global action. It does not refer to an existing technology or technical upgrade.

293

African storytellers.
We have discussed elements of culturally compelling content and suggested a
crowd-powered model to harness it but are confronted with the real barriers that are faced
by today's average storyteller on the African continent. Going beyond qualitative
attributes of what makes content "good" or viable, content creators need access to
financing, production tools, and technical expertise. These are nearly impossible to obtain
if one has little disposable income, technical infrastructure and education. Though
significant improvements have been made, even basic access to the tools of ICT,
Internet and mobile telephony, is still only found in urban centers and/or among those with
higher than average incomes. Therefore, it is difficult for the average African storyteller
or content producer to move from the idea generation stage to the final audience reception.
So how does a twenty-year old Griot from a small village with little education and no
access to modern tools communicate his story? The Community.
UN Creative Economy Report 2008,Pg. 102 [19]

A Brief Explanation of Kiva – Web 2.0's Online Lending Community
Kiva is an online micro-lending organization that has distributed close to
$40,000,000 dollars in 42 different countries through 88 "Field Partners" 20. It was founded
in 2005 and works through NGO partnerships providing micro-loans to entrepreneurs in

various countries. The loans carry no interest rate and are not tax-deductible under the US
tax code, despite Kiva's non-profit status.
Kiva partners with in-country NGO 's, who are then responsible for management of the relationship with the micro-loan candidates (entrepreneurs). These NGO's upload
information about various entrepreneurs and the project/business endeavor for which they
seek funding to the Kiva website. People from around the world (the audience) view those
stories and select entrepreneurs and business ventures to whom they would like to lend a
minimum of $25 USD. Once the project is fully funded the monies are dispersed to the NGO, which then disperses it to the entrepreneur. The NGO also
provides periodic updates to the site from the entrepreneur on their progress. These
updates might include personal notes, photographs and business progress
reports, Kiva requires that partners have and be able to use digital cameras and daily
email.

Grio.tv: The Kiva model for African Story-tellers

Kiva has demonstrated that a crowd-sourcing model can work to provide large

19 *The Challenge of Assessing the Creative Economy towards Informed Policy-making*, UN Creative Economy Report 2008, © United Nations 2008
20 See http://www.kivafriends.org/index.php?action=graphs for further information

294

scale micro-credit opportunities to the worlds poor, quickly and efficiently. Drawing on
lessons from Kiva, Cambrian House and Zeros2Heros [21] it is possible to replicate and
adapt this model for the needs and realities of the African storyteller.
The Grio.tv system would have four core stakeholders whose interest must be
aligned. These are the content creators, in-country partners, Grio.tv and the audience.

The Content Creators

The content creators face a slew of challenges both environmental as well as technological in getting access to the tools of content production, the audience which
might want that content and the resources to fund its development. Using
the Grio.tv model a storyteller (content creator) would be able to work with an in-country
partner to make their content idea available to the audience on Grio.tv for funding. The

storyteller could generate a base line level of information about the project using Grio.tv
content guidelines and any available media (from raw music to film/ story synopsis) to
describe their project idea and what might make it both viable and compelling to an
audience.
The creator would provide their plans for content to their local partner organization
who would generate the needed online information, thus expanding the reach of the
service well outside of the urban centers and financial elite. Much of this information will
be biographical (personal story, content background etc…) and the balance would be any
media available. This model would open the realm of available content to include anyone
with a creative bent and a product idea, from urban rappers and Zouk artists to drumming
groups and village folklorists.
The content creators would retain their IP rights to their content whether the
project is fully funded by the audience or not. Their goal and motivation is to have their
project seen, voted on and potentially funded by the crowd. Overtime, a modern Griot who
was initiated to new media tools by Grio.tv would later become a resource themselves,
aiding other creators. If their work has become commercially successful, there will be yet
another avenue, financial, for them to promote newer storytellers.

21 Cambrian House is a web-based community owned business that combined crowdsourcing and peer production to find
and select viable software development ideas. http://www.cambrianhouse.com/ .Zero2Hero is a Canadian website which
allows users to submit and vote on comic book ideas for publication in Web, print and film.
http://www.zeros2heroes.com/

295

The In-Country Partner
These organizations might be local NGO's, public, cultural or academic institutions or private enterprises who wish to assist in the creation and distribution of new
African centered content. Their input is on a frontline basis, managing the initial
relationship with creator, ensuring fulfillment of basic requirement, media capture

(images, audio, video). They will also conduct and facilitate training sessions to solicit
submissions and increase initial quality standards, a known issue with many mass collaboration projects.
Aside from altruistic aims, the in-country partner will optimally have a commercial
interest in growing the IP market in their local communities. These commercial interests
would tie the success of the creator directly to improved income for any commercial
partners. In addition, the platform would allow for feedback and comments on the service
level of the partner by the creator.
While content partners have no IP rights in the product they benefit from the relationship development and the insight into the commercial viability of content in their
local market. It is also very likely that as commercially viable content becomes apparent
through crowd interaction that the management of IP and exploitation rights across
borders is something that will be required.

The Grio.tv Site
The site is the global aggregator of the content from African storytellers across media forms. It serves as an intermediary between the unwired, unbanked creative masses
and the audience seeking their stories. Grio.tv will initially provide two basic types of
functionality:
Peering – this suite of functionality allows content creators to display projects, receive
feedback on projects ideas, in the form of offers of support, votes and funds.
Marketplace – this suite of tools allows for content creators and content consumers to
establish rules to exchange value for specific digital media products.
The site will provide a trusted partner for the commercial transactions and microfinancing
aggregation. It will also handle third-party commercial partnership for services like iTunes, Amazon Unbox and Jaman. While initially there is unlikely to be either the
demand or capabilities to handle international distribution agreements the service could be
built with an eye towards helping to manage that workflow. Grio.tv is positioned as the

messaging hub for African storytellers, much like Kiva which is, in many circles, synonymous with online micro-lending. Like Kiva, Grio.tv can become self-sustaining
through voluntary and transaction related fees.

The Audience

The audience drives the service. It is through the demand based model of peer review and peer funding that any of the content creators will realize a financial incentive
to continue to participate and expand the service. Audience members will select the
stories/content that will be further developed. As in the Zero2Hero or Cambrian House models, Grio.tv has a two-tiered system where ideas/projects are both voted on to
filter out the most viable for funding and then presented for funding. The audience can
have either a fixed or variable time in which to fund projects (determined by the content
creator) and projects not fully funded in given time frame are returned for reworking and
the moneys dispersed back to contributors.

296

Conclusion

In our globalized world where someone in Lilongwe, Malawi wakes up to the weather forecast for Leeds, England, even local content is in competition with the
offerings from global content providers. Despite the asymmetry in access to tools and
resources that larger more experienced global content providers have, The Bollywood, and
more-so the Nollywood movie industry, shows us that there is a market for culturally
compelling content that delivers and makes accessible different identities of the world.
In Africa's context, a great many of the creators are limited not by content ideas or
sources, but by tools for content production, finance, and distribution. The creator is not
only limited in reaching a broad local audience, but also potential audience members in the
international market. Therefore, a sustainable Web 2.0 approach is suggested through
involving the creator, an in-country partner, the Grio.tv operation, and the audience that

allows demand for African oriented content to drive the process and supplement weak

points in the value chain for producing more content reflective of the African tradition.

REFERENCES

297