THE CREATION OF A COMMERCIAL SOFTWARE DEVELOPMENT COMPANY (SDC) IN A DEVELOPING COUNTRY FOR OUTSOURCING PURPOSES

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INTRODUCTION

Some case studies are qualitative while some are not. Custom also has it that not everything is a case, but having firstly established the criteria for case studies and it was therefore decided to subsequently follow the case study method. This was also done because the authors felt that the creation of a software development company (SDC) justified a case study. This was further motivated because there has been a growing interest in the use of qualitative techniques in the administrative sciences and the case study could do justification to research.

This case study will therefore report on the creation of a software development company (SDC) in South Africa using a detailed description of interrelationships between perceptions of what is happening in developing countries and what is happening in developed countries. The case describes the scenario and contributions stemming from the methodological point of view. The case study also illustrates points such as the value of following a structured method of establishing a methodology for starting such an SDC. The need is discussed for context specific measures of the characteristics for an SDC and the reporting of process measures while establishing an evaluation of the SDC that is being created. Also the need to explore the necessary relationships between the clients and the systems that are created and the perceptions of the clients are discussed. This is because the unidirectional assessment of the SDC can impact on the users and user characteristics and on computer software implementation. Despite the normative nature of the SDC the most important conclusion is the desirability for a variety of approaches to studying SDCs. No one approach to SDC research can provide the richness that information systems research needs for further advancement of the skills in a developing country.

INFORMATION SYSTEMS IN SOUTH AFRICA IN CONTEXT

South Africa is a medium sized country, 471,000 square miles at the southern tip of the African continent with a population of some 43 million people. Relative to the rest of Africa, South Africa is substantially industrialised. The Republic of South Africa is a wealthy country from an industrial and agricultural point of view and computers have been actively in use in South African business and industry since the early 1960s when both IBM and ICL opened offices in Johannesburg. Today South Africa employs computers in every aspect of industry, business and government as well as having a relatively high percentage of home computers among the middle class. All the major vendors are present and there is considerable interest in hi-tech.

The business and industrial sectors in South Africa are as sophisticated as anywhere in the world in the use of information systems. South Africa leads the world in deep level mining and supports this activity extensively with computer systems. The country also has a substantial financial services sector that has won international recognition for its excellence in information technology. For example the First National Bank (FNB) of South Africa was named one of the world's top 100 computer users by ComputerWorld Magazine in May 1995 and in July 1996 the same bank also won the prestigious Smithsonian Institute prize for the innovative
application of biometrics in their information technology.

BACKGROUND

Information Systems play an important role in the survival of a country and its organisations. Coupled with the lower costs, increased processing capabilities of hardware and cost conscientiousness of many CIO’s and CEO’s, it becomes a vital source of deriving efficient and cost effective solutions for organisational problems. A good manager using a well organised information system enhances any organisation’s ability to compete favourably and it minimizes the assumptions and presumptions in decision making that could lead to bad performance and eventually the downfall of the organisation.

In many organisations, information technology (IT) (especially software) also shapes the process of product development. Organisations that are able to adapt new software technology into their development process have often seen increased productivity and improvement overall in product quality. This is why so much emphasis is being placed in South Africa on the correct procedure for software development. This has provided the motivation for many organisations to strive to become a software development company (SDC).

The cost of software development systems, like information systems, stems directly from the cost of resources required to provide and support the functions of systems. The decision to outsource development to SDCs can be a serious strategic change. Therefore, before managers can support software engineering, these SDC’s must have a realistic understanding of the viability and of the costs and benefits of the tools. Cost benefit analysis usually can mean continuous reaching of goals (Lubbe, 1997). Benefits must usually exceed costs to justify the expense and this is another reason why organisations will look at SDC’s as an alternative to developing software in-house.

The economics of software engineering has often focused on software cost estimation. Essentially this is a consideration of the costs related to single development project. First world sophistication, which is in demand, requires worldwide growth of the use of information technology. However, a worldwide shortage of information technology skills exists. The high level of South African skills (business and technical) consequently causes an alarming rate of loss of top skills and thus a shortage of quality human resources in the IT sector.

MOTIVATION FOR STARTING A COMMERCIAL SOFTWARE DEVELOPMENT OPERATION

The external business pressure causes conversions and downsizing of industry sectors. This in turn causes a trend towards more efficient, focused business SDC’s. The increasing competition in the global market place and new entrance is another motivation for starting a new commercial software development operation. The demand for faster and more cost-effective software systems delivery causes better local content as well as flawless production services which can also be another motivating factor.

Some of the internal IT pressures such as skill shortages, the need for incentives to retain IT staff, perceived lack of professionalism, better productivity, delivery speed, quality and clear career paths could be a very good motivating factor for starting an SDC.

Further motivation for starting an SDC in developing countries could be to stop the outflow of South African talent by creating job opportunities for new graduates. The worldwide dispersion of these talents could be prevented, ensuring a nucleus of Software Developers.

For all Software Developers, recruitment opportunities would be created, thus enabling a contracting option and keeping their talent for the newly proposed SDC’s. The SDC should ensure retraining of these people - ensuring interest, loyalty and the driving force to succeed in the company. Creating the above mentioned nucleus of software experts makes it easier for customers to rely on excellent solutions and maintenance of the completed products. The solution could be a result off a mixture of the right professionals leading to applicable end products.
CREATING A COMMERCIAL SOFTWARE DEVELOPMENT COMPANY

Background to starting a new SDC

The vision of the SDC Company is to become the leading SA systems integrator for speed of delivery, quality and value, using the most advanced tools and techniques and to be the most appealing IT employer in SA.

One should keep in mind that to start large-scale software development company, some projects, such as high-volume commercial transactions processing systems, require advanced analysis, design and development techniques. This will also entail doing an evaluation of the SDC’s software development process in respect of the Capability Maturity Model (CMM). Currently a minimum of CMM Level 3 has been targeted. This will ensure that a standard system development process is integrated throughout all development activities of the SDC. As a result of this a degree of certainty in the quality of the software products will be guaranteed. Furthermore this will also allow the SDC to benchmark its development process against international standards.

The present SDC Company has signed and completed more than 1700 maintenance requests in their first year of operation. On the other hand, they have finished 99 projects in the first year and the following figures were provided in respect of the attainment of their goals:

- 18% were delivered ahead of time
- 44% were delivered on time
- 27% were delivered within one month of the planned dates giving them a completed figure of 89%.

An issue of concern is that they did not speak about the 11% that were needed to complete a 100% record. Of the 60 projects with initial costs estimates:
- 52% were delivered under estimate,
- 28% were delivered on estimate, and
- only 20% were delivered slightly over.

The 20% delivered slightly over, needs to be defined but they declined the offer to clarify this.

The company was created in the late 1990’s by combing an established existing organisation and some key staff from the present organisation in the ratio of 3:2. The organisation presently has nearly 200 staff members and is based in one of the harbour cities of South Africa. Their future aim is to expand into international markets. They have some academic connections with one SA university since 1990 and had recruited some of the IS graduates from this university. They regard this as a long and mutual friendship.

The managing structure of the company starts as a normal hierarchical organisation, with a Managing Director at the top and directors for various departments. The operations director controls the following sectors: strategy and architecture, software factory, business intelligence, systems maintenance, support and renewal, project office and network infrastructure (see figure below).
The company identified the software manufacturing industry in South Africa as a situation of concern. They identified the current outputs of the IT industry as of a low standard and regard this as a future challenge for the success of the SDC. Their strategy is basically to prevent high staff turnover and to keep abreast of dramatic changes in the software manufacturing business.

SERVICES AND OPERATIONS OF THE SDC COMPANY

The company's services include items such as strategy and architecture, software factory, business intelligence, systems maintenance and support renewal.

On the strategic architecture side of the SDC, IT enabled business transformation consulting for this newly established organisation consists of project definition, planning and management. Analysis is an important aspect of any SDC and for this specific SDC that had been set up.

The design of processes, applications and technology are important factors for managers of SDC and the organisation. Business migration and development co-ordination is an aspect that should be kept in mind by the managers when they want to develop a new system or application and development of technology.

All of this ensures business change and proper development co-ordination. The SDC can evaluate packages on behalf of any organisation and look at gap analysis in order to ensure that all variations are within all acceptable norms.

Project Management is an important facet of systems development. The SDC would, however, struggle to do some systems integration if they are not an integral part of the company. The SDC’s staff however, needs some training in order to ensure a successful implementation.

On the other hand, business systems development is the main thrust for the company that had been selected as part of the case study component. They specialise in enterprise systems groups and the distributed systems for any organisation. Their approach is an engineered, model-driven approach with tight project definition, management and control. They feel that this approach would enable them to satisfy requirements from organisations that approach them. They implement changes and new systems with a minimum disruption to any organisation.
The problem they face is that as an organisation they have only 6 years component-based developing experience. However, overall the combined experience of the staff might be several years. They specialise in applications such as GEN (Sterling), Microsoft, DB2, SQL server and Oracle.

The Business Intelligence section of SDC entails the formulation of a data warehouse strategy for the organisation by designing developing and helping to implement the data warehouse. They regard their duties as including the following: data analysis and DB design, data sanitisation and transformation, data warehouse development and metabase management. The important aspect of this part of their duty includes data distribution, data mining, information reporting and decision support. Here they use software such as SA.S, BO, DB2 and the SQL server.

The systems maintenance, support and renewal sectors include some of the following duties:

- Service level agreement
- Production maintenance, running and control
  - Help service desk
  - Request logging and work tracking
  - Change control and management
  - Production management, support and standby
  - Optimisation of platform
- Legacy renewal via internet enablement and component wrapping

They use software such as COBOL, IDB2, IDMS, ADS/Online, MS and Delphi.

The strong point of the SDC is whole personal finance solutions. The system entails personal insurance (life and risk), employee benefits and medical aid thus ensuring a well developed financial package that ensures that the human resources section of any organisation is well run. In this regard they use an EB2000/Dataway.

Their customer base expansion strategy includes the EB centre (retirement funds, life insurance, properties, healthcare and investments) while they work across industry into telecommunications, transport, utilities and manufacturing.

**THEIR APPROACH TO SYSTEMS DEVELOPMENT**

They use a twin track type of development. This entails the following:

The first step is the usual application requirements gathering, analysis and design. During requirements gathering and analysis, the underlying philosophy is centred around in-depth identification of business needs. It is recognised that these phases of development are as crucial in terms of final product quality, as is the choice of development technology and actual construction. Therefore the deployment of good analysts with sufficient experience in the client’s business area is given a priority.

Thereafter development is split in two different tracks along a component based development timeline.

- The first track entails component design and operation specification and the specific development of components. They release the component and the two tracks meet each other.
- During the first track's process they also release the component interface release to the second track developers.
- The second track entails the application interface prototyping, building the application and application integration testing. There is communication between these two tracks all of the time in order to ensure that tile timeline is honoured.

- The last combined step is the application release builds whereby the application is installed and tested in the organisation.

The important step for SDC is the tactical delivery approach that the organisation follows. They follow the European approach whereby code and older software is re-used. If this approach is not applicable they would investigate. If it is not better to buy, they build the application. If this is not applicable, then build for re-use would be their suggestion to their clients. Their target market is existing...
systems in the open market but their conceptual approach might differ. They keep a stock of component objects they can re-use. During the development process they adopt an approach such that the end product is the application that can be generalized and used for other companies as well.

**TAXONOMY OF COMPONENTS**

Their taxonomy could be divided into two sections. The first section is the technical section and deals with the following aspects:

- The security aspect has 8 entities in the component and more than thirty public operations. The ADPV is a purchased component as well as the audit part of it. They do registration of all the parts they develop and install.
- The main taxonomy of components can be found in the business side of the organisation. They have 40 FIC applications and 19 public operations.
- The important aspect of their business is the client environment (69 entities and 11 public operations), investment applications (12 entities and 2 public operations), contribution applications (14 entities and 3 public operations), annuity costing basis (11 entities and public operations), EB event (1 entity and 3 public operations), Client agreement role (68 entities and 14 public operations), Fees (12 entities and 2 operations), Notation (5 entities, 2 public operations), Annuity calculations (2 entities), global operations (no entities or public operations), agreement applications (40 entities, 11 public operations), portfolio applications (34 component entities and 5 public operations) and some investment switching applications which they have finished but nothing is sold yet.
- Components in the developing pipeline entails issues such as EB Late Pay Limits, EM Membership fixed property, EB Bonus Rates, EB Commutation limits and global tax rates and limits.

The results of the joint venture is that they had a successful HR transformation ensuring that they do not lose too many of their employees (8% versus 25% previously). Their productivity is 100% better and therefore they can deliver systems faster. There is an international demand for their products.

**BROAD REQUIREMENTS FOR SUSTAINING SDC DEVELOPMENT**

In order to succeed an aggressive government plan is needed. Industry and regional initiative need to be co-ordinated and correlated. The important aspect is free movement of information and skills. This means the elimination of inflow barriers for high-tech skills. To reach this goal, the government needs to do aggressive international marketing. Furthermore the Government needs to offer incentives for sustaining the growth of SDCs. Some ideas could be tax holidays for new start-ups, facilitation of international links and knowledge exchange programmes etc.

**SUSTAINING THE GENERATION OF SDCS**

Companies need to copy examples of the growth of a national software capability that will ensure survival. This would require a prototype roadmap for the growth of a software centre. A lesson can be learnt from the government of India: The Indian government has drawn up some software companies contracts with multi-nationals to send Indian programmers to work in the USA or Europe at the client’s site or under direct suspension of clients’ technical managers.

Indian companies set up development centres in India where development and maintenance were done under Indian managers. Typical projects were systems maintenance, software test development and execution as well as software components.

Furthermore some value adding is required while companies are building their Research and Development capabilities. This would require:

- Highly developed project management capabilities;
- Quality by decision;
- Extensive employee training; and
- The highly evolved practise of process
engineering and relationship management.

The South African software industry and the SDC’s need extensive domain knowledge in banking, insurance and financial services. They also need to create new technical capabilities and products to sell overseas.

For all of this SDC’s in developing countries need a highly educated work force, low cost of labour, highly developed information and telecommunication infrastructure and business modules consisting of:

- Pilot project;
- Larger scale development;
- Dedicated development centres; and
- Own development units.

The success factors of countries such as India and Ireland need to be copied. South Africa and other developing countries would like to educate a young, highly educated workforce with strong technical and business skills. These workers need to be highly effective and efficient.

SDC’s need full government support for the industry, with both financial and nonfinancial industries for both indigenous and overseas companies. This would make these countries an ideal gateway to the international markets.

To summarise some patterns:

i. well educated work force is mandatory

ii. Do not start building independent products

iii. Take advantage of regional markets.

CONCLUSION

They have strong financial services knowledge with strong cross-industry technical skill capability and an emphasis on advanced development techniques and tools. The model they are using is proving to be successful for all parties and the growth process had provided them with invaluable experience and expertise in the HR transformation. They think they are well positioned for significant growth.

REFERENCES

Can be supplied upon request.