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Measuring ICT Project Success in Botswana Using CHAOS Report criteria

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Abstract. A new definition of success from a global perspective of software project success suggests that software projects are successful when they are on time, and on budget with satisfactory results. This study evaluates ICT projects success in Botswana using this criteria.. 20 senior managers who had participated in ICT projects from 6 organizations were interviewed. The result suggest that the high impact level success factors of were more of technological component, while the human resource and organizational component categories contributed least success factors. Overall, there is no ideal success of projects, but acceptable successes were achieved. This suggests that satisfactory results could not be assured, hence the CHAOS report criteria of success might not have been achieved

Keywords: ICT Project, project management, Success assessment, Chaos success criteria

1 INTRODUCTION

The importance of Information and Communication Technology (ICT) as a tool for organizational success cannot be over emphasized. A focused and successful ICT project could enhance a company's productivity, management effectiveness and quality of service delivery. Although many research reports such as [4,5],[9],[18,19] identified software project success factors from many perspectives, the CHAOS report provides a new definition of project success in terms of a project being "on time", and "on budget with satisfactory result". Following this perspective, a study in [18] provides a project resolution based on the three factors : successful, failed, and challenged. According to [19] successful projects could be due to the following factors: Improved project environment processes, effective project methods, skilled personnel, effective project costing, tools, decisions, optimization, addressing of the project internal and external influences and effective team chemistry. According to [10], IT projects are successful when they are executed within scope, schedule, budget, goal and there is value added.

This paper evaluates ICT projects executed in Botswana using CHAOS reports success factors of "on time, and on budget with satisfactory results" .

1.1 Statement of the Problem

A new definition of success from a global perspective of software project success suggests that software projects are successful when they are on time, and on budget with satisfactory results. This provides a global platform for measuring acceptable success of ICT projects. In Botswana, the success level of ICT projects have not yet been ascertained based on this new criteria.

1.2 Aims and Objectives

This paper aims to examine ICT project executed in Botswana, and the contribution of "on time, and on budget with satisfactory results" factors to ICT project success or failure

The objectives are as follows:

- To identify the high impact level factors contributing to success of ICT projects in Botswana

- To identify the high impact level factors contributing to ICT project failures in Botswana
- To ascertain the contribution of on time and "on budget with satisfactory result" factors in government funded ICT project

The rest of the paper counts of 5 sections. Section 2 presents a review of the literature. Section 3 presents the methodology of the study. Section 4 presents the result of our study, and section 5 the conclusion

1.3 Study Research Questions

This study investigates the following research questions:

(a) What are the high impsct level success factors of ICT projects in Botswana

(b) What are the high impact level failure factors of ICT projects in Botswana

c) Does Organizational schedule contributes to project success in Botswana

d) Does Organizational Budget contribute to project success in Botswana

e) Does Organizational size and number of team members contribute to project success in Botswana

f) Does Project manager experience affects the success/failure of ICT projects in Botswana?

2 LITERATURE REVIEW

Botswana aspires to implement a set of project critical success factors in order to address the completeness of government-funded ICT projects [8]

In [16], it is suggested that the government of Botswana plays a leading role in developing the ICT infrastructure as this is a requirement for the success of e-government implementation in Botswana. This will insure that the nation's internet backbone and the International Gateway are managed effectively. Further, the government supports the development of fibre-optic network for efficient broadband communication in order to reduce the rate of internet access through ISPs [7], and hence create an create an enabling environment for the adoption of ICT in everyday lives of its citizens as a starting point of the e-government implementation project.

To achieve successful implementation of IT projects in Botswana, [16] suggests that the project must be acknowledged and supported by all stakeholders. In [6] it is further suggested that for successful ICT projects in Botswana there must be proper project planning and risk management. Other factors critical to project success are discussed and summarized in [5]. These include management issues, communication issues, training and education, team composition, available resources, stakeholder involvement, software development issues, implementation strategies e.t.c.

In terms of failures, IT project fail when the IT system does not deliver required expectations within the expected time and expenditure [3], [9], [19]. The key reasons for ICT projects failure have been identified in [1],[11,12,13,14],[20]. In Botswana, suggested failed ICT projects include the MALEPA system project [15], the Livestock Information Technology System Agricultural project (LITS), and the Botswana Telecommunication Communication (BTC) billing system project [17].

MALEPA system is a web based examination programme intended to process and release the Botswana General Certificate of Secondary Education (BGCSE), Junior Certificate Examinations (JCE) and Primary School Living Examination (PSLE). MALEPA system experienced technical problems and quality was compromised to keep alignment to the product schedule constraints. The project attracted additional cost of more than P40 million to the initial budget of P1.7 million to fix problems with the project. The reason behind the MALEPA system failure has been attributed to the poor estimation techniques, poor project planning, poor

The Livestock Information Technology System Agricultural project (LITS) failed due to poor understanding of user requirements, and poor management factors. The failure of this project resulted in the huge loss of revenue from beaf consequences of the failed project is a critical loss in government revenue from Beaf.

Furthermore, Botswana Telecommunication Communication (BTC) billing system was a failed project due to improper project planning techniques and the failure to adapt to business change factors [17]. The BTC group lost market share due to the subsequent entry of mobile operators in 2000 and the billing system introduced created doubts which also tarnished the BTC image. According to Mokgoabone (2004), the appointment of the IDI consultancy firm followed the purchase of the controversial P60 million billing system, which led to customer exodus and the substantial losses that the company experience. The market share loses were exacerbated by the liberalisation of the telecommunication industry in 1998, which led to the entrance of two mobile phone operators in the market. This compelled the BTC group to adopt a multi-million pula restructuring exercise, which involved the retrenchment of about 600 employees from the corporation. . Tables 3, 4 and 5 show the summary of factors responsible for project success and failures respectively.

Projects are successful when they are executed within scope, schedule, budget, goal and there is value added.

3 METHODOLOGY

In this study, we employed document analysis of relevant literarture in order to appraise the main factors leading to software project successes and failures, and conducted interview with 20 IT mangers in 6 companies who had previously participated in ICT projects in Botswana.

Qualitative data was collected from the respondents, and analyzed using a project metric tool developed for this study Project success and failure factors were ranked based on their dominance using the metric tool Project success factors were identified and categorized based on their information system components, success categories and acceptability as shown in Tables 1 and Table 2 .

4. Result and Discussion

From this study, we categorize success as shown in table 1 below:

Table 1: Success Categorization and Acceptability

Success category	Acceptability level	Success measure
Ideal Success	Ideal	100% metrics measures available
Acceptable tolerance	Best acceptable success	Less than 100% but greater than 89.2% metric elements
	Least acceptable success	Less than 89.2 % but greater than 79% of the metric elements
Unacceptable tolerance	Worse acceptable	Less than 79% but greater than 50% metric elements
	Unacceptable	Less than 50% metric elements

The Ideal success means all the measurable elements are available. The Acceptable tolerance s category means partial measurable elements are availability. In this category the value of the success measure can be tolerated. The unacceptable tolerance success category means that measurable elements of success are below acceptability and therefore unacceptable. Table 2 presents the project success/failure measurement criteria. The table shows the success measures and its acceptability levels using our criteria. From Table 2 the prefix (A) represents the measurable elements for Technology, prefix (B) represents elements for the Human resource component and (C) represents measurable elements for Organizational components of Information systems . When a project comprise of all the valid success factors then the success measure is ideal successful project. Otherwise if partial or no valid factors were discovered then it was regarded as a theoretical failure

Table 2 Success or failure project measurable criteria

(A) Technological	(B) Human resource
A1 - IT functionality/ Capabilities	B1 – Use of Consultants
A2 - Ease of use/ quantity of use	B2 - Project Management
A3 - Happiness/willingness of end users	B3 - Project Manager experience
A4 - Technology and Technological issues	B4 - User training, education and support
A5 - Software development Methodology	B5 – Project Champion
A6 - Software prototyping and testing	B6 - Commitment
A7 - Vendor capabilities	B7 - Cooperation
A8 - Outsourcing strategy	B8 - Productivity
A9 - Implementation strategy	B9 - Empowerment
A10 - IT solved problem(s) that was intended to solve	B10 – Core competency
A11 - Software quality	B11 – Flexibility
A12 – Safety	
(C) Organisational	
C1 - Top management support	C13 – Leadership style
C2 - Project schedule	C14- Stakeholder management
C3 - Project Time	C15 - Security strategy
C4 - Project cost	C16 - Business process re-engineering
C5 - Project accuracy(specifications met)	C17– Organisational Benefits
C6 – Requirement Management	C18- Process improvements
C7 - Change management	C19 - Manual process intervention
C8 - Cultural management	C20 - Operating efficiencies
C9 - Quality management	C21 - Resource Management
C10 – Financial resources	C22 – Tracking of issues since implementation
C11 – Expectations Management	
C12 - Business plan and vision	C23 - Business growth support
Total metrics elements: 46	

4.1 ICT/IT project success factors

From this study, high impact success factors from interview analysis and interpretation is shown in table 3, and for high impact failure factors in table 4 (research questions a & b).

Table 3: High impact level success factors

IS Component	Success factors	Company A	Company B	Company C	Company D	Company E	Company F
Technology	**A1** - IT functionality/ Capabilities	✓	✓	✓	✓	✓	✓
	A4 - Technology and Technological issues	✓	✓	✓	✓	✓	✓
	A9 - Implementation strategy solve	✓	✓	✓	✓	✓	✓
	A10 - IT solved problem(s) that was intended to solve	✓	✓	✓	✓	✓	✓
Human resource	**B4** - User training, education and support	✓	✓	✓	✓	✓	✓
	B6 - Commitment	✓	✓	✓	✓	✓	✓
	B9 - Empowerment	✓	✓	✓	✓	✓	✓
Organisational	**C6** - Requirement Management	✓	✓	✓	✓	✓	✓

Table 4. High impact level failure factors

IS Component	Failure factors	Company A	Company B	Company C	Company D	Company E	Company F
Technology	**A10** - IT solved problem(s) that was intended to solve	✓	✓	✓	✓	✓	✓
Human resource	**B1 –** Use of consultants	✓	✓	✓	✓	✓	✓
	B2 - Project Management	✓	✓	✓	✓	✓	✓
	B6 - Commitment	✓	✓	✓	✓	✓	✓
Organisational	**C1** - Top Management Support	✓	✓	✓	✓	✓	✓
	C5 – Project Budget	✓	✓	✓	✓	✓	✓
	C13 – Leadership style	✓	✓	✓	✓	✓	✓
	C14 – Stakeholder involvement	✓	✓	✓	✓	✓	✓

From table 3 the high , impact level success factors embedded in the organizations belong to the Technological component category. The human resource category constitutes fairly low high impact level success factors and the least factors belong to the Organizational component category. Therefore it can be concluded that most of the senior managers who delivered successful IT projects focused on delivering the IT product in terms of functionality and usefulness (problem solving).

4.2 Project Success factors categorisations

Table 5 presents a ranking of the dominant success factors rankings using the organizational component. The organization with the most dominant success factors is given higher priority over the one with least dominant success factors.

Table 5 Project success and categorization

Organisations rankings	Summary of project success factors ratings measured up against the Metric model	Metric tool success categorisation
Company A	40/46 (86.9%)	👋Acceptable success
Company B	36/46 (78'2%)	👋 Unacceptable success
Company F	34/46 (73.9%)	👌 Unacceptable
Company C	33/46 (71.7%)	👌 Unacceptable
Company E	31/46 (67.3%)	👌 Unacceptable
Company D	30/46 (65.2%)	👌 Unacceptable

Note: 👍Ideal Success (46 All elements fulfilled) 👋Acceptable tolerance (45 –36 elements fulfilled)
👌Unacceptable tolerance (less than 36 elements fulfilled)

From the Table 5, there is no ideal success of examined projects. Only company A attained acceptable success, while others attain different degree of unacceptable success. This suggests that few of the organizations attain higher desired level of IT projects success, while more organizations fall in the acceptable tolerance category. A project that satisfies all the success factors attain ideal success. However most of the successful projects fall within the most critical success category. These IT projects have fulfilled less than 36 measurable elements requirements, and hence these project do not fulfill satisfactory result condition of the CHAOS instrument (implied in research questions c and d).

4.3 Organisations schedule and budget constraints

Table 6 present the organizational project successes with respect to the schedule and budgets constraints (research questions c, d and e).

Table 6: Organizational schedule and budget constraints

Organisation success rankings	Success factors summary ratings	Schedule of the project	Budget allocated (P=Botswana Pula)
Company A	✋	2 years	P13m
Company B	✋	3years	P30 m
Company F	👌	5 years	< P127 m
Company C	👌	7 years	< P340 m
Company E	👌	5- 7 years	P284 m
Company D	👌	7 years	P400 m

Note: 👍Ideal Success (46 All elements fulfilled) ✋Acceptable tolerance (45 –36 elements fulfilled) 👌Unacceptable tolerance (less than 36 elements fulfilled)

From table 6 most IT projects which were in acceptable tolerance success category have typically been allocated small budgets (between less than P127 M and P400 M i.e between less than $11 Million and $37 Million), and scheduled to be executed between 2-7 years. Specifically the budgets increased with the size and complexity of the project, although none attained ideal success (by our measurement criteria) even with available budget. It appears that as the magnitude and complexity of the project increases with the schedule and budget constraints, the achievement of the desired level of success was compromised.

4.4 Organisations size and number of team members involved

Table 7 shows the organizations size and the number of team members involved as the other dimensions used to evaluate the organizations project success. As indicated in Table 7, the organization size with respect to the number of the team members involved contributed to the overall IT project success.

Table 7: Organizations size and number of team members involved

Organisation success ranking	Success factors variance summary ratings	Organisation size (employees)	No. of team members involved
Company A	🖐	< 170	6
Company B	🖐	150	15
Company F	👌	<300	10
Company C	👌	870	20
Company E	👌	< 800	≈15
Company D	👌	< 750	10

Note: 👍Ideal Success (46 All elements fulfilled) 🖐Acceptable tolerance (45 –36 elements fulfilled) 👌Unacceptable tolerance (less than 36 elements fulfilled)

Table 7 suggests that organizations with projects that fall within the acceptable tolerance success category are the ones that constitute less number of employees and few number of project team members. This is not the case when you examine organizations that deliver less successful IT projects but falling under the unacceptable tolerance success category. As such it can be suggested that IT project success in organizations has some relationship to organizational size and number of team members involved in the projects. Thus; the organizations with large number of employees and number of team members involved might have management challenges. Therefore the IT project is bound to be fairly successful but not up to its full potential.

4.5 Organisations success and senior manager's experience

Table 8 presents senior managers experience in terms of number of years in current position and frequency of their involvement in IT projects, while Table 9 presents organizational success and acceptability level.

Table.8: Organizations success and senior manager experience

Organisation success ranking	**Success factors variance summary ratings**	**No. of years in present position**	**No. of IT projects involved**
Company A	🖐	8 years	5
Company B	👌	13 years	≈ 10
Company F	👌	15 years	≈ 9
Company C	👌	≈ 5 years	7
Company E	👌	≈ 2 years	2
Company D	👌	≈ 3 years	5

Note: 👍Ideal Success (46 All elements fulfilled) 🖐Acceptable tolerance (45 –36 elements fulfilled) 👌Unacceptable tolerance (less than 36 elements fulfilled)

Table 9: Organizations success and acceptability

Organisation success rankings	Technology	Human resource	Organisational	Metric Total value of Organisation project success	Success Category	Success Acceptability level
Company A	17.39%	23.91%	45.65%	86.96%	☑	👌
Company B	21.74%	19.57%	36.96%	78.26%	☑	👌
Company F	19.57%	19.57%	34.78%	73.91%	☒	✌
Company C	17.39%	19.57%	34.78%	71.74%	☒	✌
Company E	17.39%	19.57%	30.43%	67.39%	☒	✌
Company D	15.22%	15.22%	34.78%	65.2%	☒	✌

Note: ☑Acceptable tolerance ☒Unacceptable tolerance 👌Ideal Success 🖐Best acceptable 👌least acceptable ✌worse acceptable 👎Unacceptable

From Table 8, in organizations that delivered successful projects, (projects in the acceptable tolerance success category), most of the IT senior management indicated a higher number of years of experience in their project management position. The senior managers also indicated a greater frequency of involvements in similar projects. This shows that projects managed by well experienced managers are likely to be highly successful compared to those managed by less experienced managers. Similarly, projects managed by less experienced managers are likely to fail.

As shown in table 9, the measurable factors indicate that very few projects were highly successful but the success is not up to the desired satisfaction (CHAOS criteria not fulfilled). The IT projects which were in unacceptable tolerance success category were the worse acceptable, thus the projects were still successful but not desired.

5 CONCLUSION

Therefore, from the results it can be denoted that most of the IT projects in Botswana could be successful in functionalities and acceptable. However, it is suggested that the projects could fall short of the CHAOS report criteria definition of success. This conclusion should be further investigated with a larger sample of Botswana ICT projects data

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