An Examination of the Benefits and Challenges of Data Warehouses Adoption in SMEs of Zimbabwe

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Abstract
The Small and Medium Enterprises play a significant part in Zimbabwe’s economy. Over the last two decades Data Warehousing (DW) has evolved to become a foundational cornerstone of enterprise decision support. However, prior research shows that small and medium-sized enterprises (SMEs), in particular, lag behind in the proliferation of DW. In this study we examine DW adoption within SMEs of Zimbabwe. We explore perceived benefits and challenges in their effort to implement DW. A survey was conducted via an online questionnaire. The results illustrate some benefits of a data warehouse, which is a single repository of subject-oriented historical data that is organised to be accessible in a form readily acceptable for analytical processing activities. However, the complexity of a data warehouse can be very high, both to build and to maintain.

Keywords
Data Warehousing, Small and Medium Enterprises, decision making.

I. Introduction
SMEs are defined by handling of qualitative and quantitative method. SME is a company that has fewer than 250 employees and has an annual balance sheet [1]. While larger organizations have specialists for information systems (IS), the information technology (IT) department. In SMEs the decisions making are made among the owners who might not have deep IS knowledge and experience. There are already a number of studies on DW. The data warehouse industry is the technological basis of business intelligence which has reached full maturity and acceptance in the business world [2]. Due to its complexity and high costs, the technology itself is used preferably by large organisations [3]. To the best of our knowledge, there have not been any analyses focussing on the major data warehouses benefits and challenges with a special focus on SMEs on the level as covered below. Due to the development of economy and the benefits they could derive from proper utilisation can improve decision making. The study is to link DW adoption in SMEs with a general DW success factors and DW challenges. In addition, it might be useful to focus on general possible benefits and problems prior to detailed facts as defined in studies, to give executives a first decision support on DW adoption.

II. Research Design
The research questions were as follows: What are the general benefits perceived by SMEs? What groups of challenges are to be expected when adopting DW? To answer these questions, we conducted a study on a set of Zimbabwe’s SMEs in the Midlands Province. With a subject base of S = 100 we expect our results to be justifiable. The research questions were answered both with academia and practice. Academics gain a deeper insight into data warehouses character of SMEs and can align their research to better support SMEs in decision making processes. Practitioners benefit from our research by becoming aware of different enterprise types. Overall, our research will help SMEs to better tackle problems with DW systems and specify the benefits that they can expect from these kinds of systems. We aim to identify underlying constructs related to the perception of DW benefits and challenges encountered when introducing DW to the organisation [4].

III. Data Collection
The sample used was the result of a survey conducted via an online questionnaire. We used previous work on DW success as a framework for the development of our SME-focussed items. The questionnaire was distributed in two ways. First set of questionnaire was completed by experts from academia. Second set of questionnaire was completed by practitioners in SMEs. The survey was conducted from 4 February 2013 to 18 February 2013. For each of the two areas of concern the participants were asked to make judgements concerning 20 items. Properties were scored on a five-point rating scale. Possible responses ranged from 1 (“does not apply”) to 5 (“applies completely”). We selected 100 SMEs from Midlands Province. The companies having their headquarters in Harare were contacted individually via email, explaining the research goal and inviting them to take part in the survey providing an attached questionnaire. The invitation contained a request to forward the mail to the managing director or a person with comparable insight into and responsibility for both business and IT strategy. Of the above SMEs, 70 took part in the survey, which corresponds to a return of that had deployed DW solutions. The sample size can be regarded as a good fact base for an exploratory analysis [3]. Examined SMEs fall into the category of SMEs, emphasis lies on enterprises having between 2 and 24 employees (72%), and a balance sheet total of less than USD1 million (65%). Respondents to the survey were largely SMEs practitioners (55%) and academia 45%. The sample is evenly distributed across Midlands Province industry sectors comprising mainly SMEs in services (25.7%), manufacturing (18.6%), and IT (12.9%) industries. The remaining 42.9% subsume SMEs from other sectors.

IV. Data Analysis
We conducted two analyses: one to deduce the perceived beneficial factors of DW application in SMEs and other to obtain problem factors or challenges encountered by SMEs applying DW. On the perceived benefits of DW adoption in SMEs, the analysis was to derive factors describing the perceived benefits of DW adoption in SMEs [5]. The grand perceived benefits showed 86%. The three general DW benefit factors can be described as follows: DW benefit factor 1: Improvements in data support: this first factor encompasses all attributes that are connected to reporting and its improvement. For example, it includes the reduction in the overall effort concerning data analysis and reporting as well as improvements in the reports’ quality and a more flexible reaction to new information needs, DW benefit factor 2: Improvements in decision support: This factor 2 covers the attributes that can be associated with decision support and its improvement. It contains facts about improved business decisions through more precise as well as more current data analyses. In addition, the identification
of chances and risks can be improved by using DW solutions. Also the improvement in the business results loads onto factor 2 and DW benefit factor 3: Savings: the third factor includes statements which pertain to successes in rationalisation. These include attributes regarding savings in personnel and in costs. By saving personnel and costs, competitive advantages can be achieved indirectly, either by diminishing the cost part in the income and loss statement or by having the possibility of using the saved resources in other areas.

However, the grand challenges for DW adoption in SMEs were conducted aiming at identifying challenges for the adoption of DW in SMEs [6]. The grand challenge was computed to 94%. The three general DW challenge factors can be described as follows: DW challenge factor 1: Challenges depending on usage, factor 1 includes statements that are directly or indirectly connected with usage of the DW solution; for example, the handling is too complicated, the processes of the DW report building are too complicated, or personnel using the DW solution are not qualified enough. So if there were training, the users could have a better understanding of how they could work with the system in the correct way, DW challenge factor 2: Challenges depending on solution and data quality; the second factor covers problems that are connected to the solution and data quality of the DW solution. Software errors, an inadequate security function, contradictory data, low speed of the product, and insufficient support belong to this group and DW challenge factor 3: Challenges with interfaces; the factor encompasses variables concerning interfaces such as limited data export functionalities and a problematic conflation of data. The two items can cause the need to import/export data manually, which usually takes longer than automatic input/export.

In the next step, this can lead to data being not current enough.

V. Conclusion and Recommendations
The goal of the presented study was to examine general DW benefit factors and challenges factors with a special focus on SMEs. Improvements in data support, decision support, and savings (e.g. costs, personnel) were identified as general DW benefit factors. DW challenges are related to usage, solution and data quality and interfaces. The findings are both original and significant; there are some limitations of note in the research. The focus on the Midlands Province drives the question of whether the results could be generalised. While Midlands Province is located in the centre of the Zimbabwe and therefore has similar conditions to the rest of the country, the study could be repeated on a regular basis with a broader participant base. The results of the study can create value for three groups: SMEs that plan to launch a DW solution, DW consultants and DW suppliers. Prior to the launch of DW, SMEs are able to draw conclusions about their DW solution and data quality; the second factor covers problems that are connected to the solution and data quality of the DW solution. Software errors, an inadequate security function, contradictory data, low speed of the product, and insufficient support belong to this group and DW challenge factor 3: Challenges with interfaces; the factor encompasses variables concerning interfaces such as limited data export functionalities and a problematic conflation of data. The two items can cause the need to import/export data manually, which usually takes longer than automatic input/export.

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References


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