Business Intelligence: A Managerial Tool to Improve Business Performance. Case Study: Henkel Algeria

ذكاء الأعمال: أداة إدارية لتحسين أداء الأعمال. دراسة حالة: هنكل الجزائر

Asma YABOUCHE [1], Mustapha BOUKHATEM [2]

[1] Ecole des Hautes Etudes Commerciales, asmayabouche17@gmail.com

[2] Ecole des Hautes Etudes Commerciales, mus.boukhatem@gmail.com

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Abstract:

The present paper aims at identifying the contribution of Business Intelligence in making corporate performance improve. Therefore, the main research question is: "What effects does Business Intelligence have on business performance?" In an attempt to respond, the case study method has been adopted using and relying on interviewing techniques to collect data. The key findings assert that BI is especially required in business planning as well as in execution. BI has a great impact on business performance especially in terms of lowering costs; increasing revenue; and improving customer satisfaction.

Keywords: Business Intelligence (BI), Enterprise Resource Planning (ERP), Data Warehouse (DW), Data Mining, Decision Making.

Jel Classification Codes: M1, M15.

ملخص:

تهدف هذه الورقة إلى تحديد مساهمة ذكاء الأعمال في تحسين أداء الشركات .لذلك، فإن السؤال الرئيسي للبحث هو: "ما مدى تأثير ذكاء الأعمال على أداء الأعمال؟" في محاولة للرد، تم اعتماد طريقة درلسة الحالة باستخدام أساليب إجراء المقابلات بغرض جمع البيانات.

النتائج الرئيسية أكدت أن ذكاء الأعمال مطلوب وبشكل خاص في تخطيط الأعمال فضلا عن التنفيذ. لذكاء الأعمال تأثير كبير على أداء الأعمال وخاصة من حيث خفض التكاليف؛ زيادة الإيرادات؛ وتحسين رضا الزبائن.

كلمات مفتاحية: ذكاء الأعمال، نظام تخطيط موارد المؤسسة، إدارة العلاقة مع الزبائن، مستودع البيانات، التنقيب عن البيانات، صنع القرار.

Corresponding author**: Asma YABOUCHE, **e-mail: asmayabouche17@gmail.com

تصنيفات JEL: M1, M15.

1. Introduction

Performance is a word that refers simultaneously to the action, to the result of the action and to the success of the result compared to some benchmark. Then, Business Performance Management (BPM) is a key business initiative that enables companies to align strategic and operational objectives with business activities in order to fully manage performance. Indeed, managing performance is one of the main functions of organizations in today's turbulent business environment. As a fact of matter, the widespread use of information technology can generate tremendous amounts of data in which an organization finds itself drowning. This data contains information that is invaluable to the organization's decision makers. Hence, with Business Intelligence (BI), users can find answers to all the questions that are raised by their activities. Armed with precise, up-to-the-minute information, users can develop effective responses that help their organization attain its goals.

In a nutshell, Business Intelligence (BI) is a process that transforms raw data into information, information into knowledge and in due course knowledge into wisdom. This can be achieved throughout the BI system major phases. First, implementing an Enterprise Resources Planning (ERP) system helps to address the problem of information fragmentation using a single relational database accessible by all modules; therefore eliminate the need for duplicate entries and eventually improve the data quality. Second, the data warehousing process creates a single version of the truth for data within the enterprise. Third, BI calls for different passive (exploratory analysis) and active (data mining) statistical analyses as well as optimization models in order to provide panoply of feasible alternatives among which the decision maker can opt for the optimal decision and correspondingly improve the business performance.

Thus, the key research question is: *"What effects does BI have on business performance?"*In an attempt to respond, the paper is divided into two parts: one theoretical, dealing mainly with concepts, and one practical, trying to give more details and illustration through Henkel Algeria case. As

far as methodology is concerned, qualitative research was dominating. First, a desk research took place both in the conceptualising phase and the practical case where internal documents were consulted. Also, the case study method was adopted relying on the interviewing techniques that helped to collect data regarding the performance of the company, its management as well as its BI system.

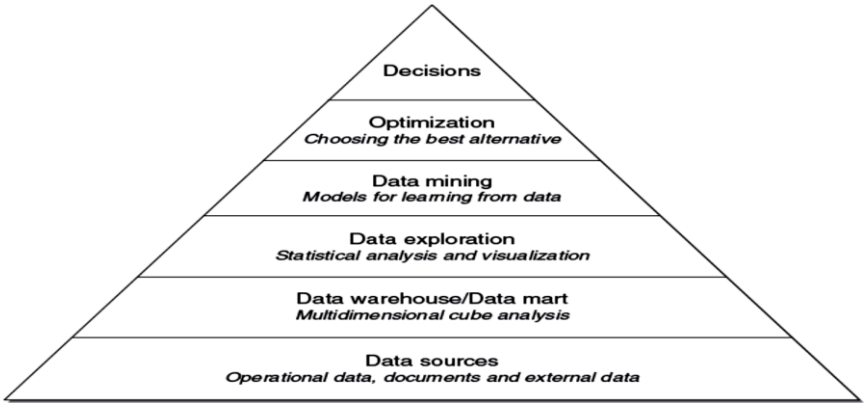
2. Conceptualising Business Intelligence:

Intelligence can be simply defined as a set of properties of the mind. These properties include the ability to plan, solve problems, and in general, reason. A simpler definition could be that intelligence is the ability to make the right decision given a set of inputs and a variety of possible actions (Jones, 2008, P1). As far as Business Intelligence is concerned, many definitions have been given, among which the following could have been selected.

According to Negash (2004, p. 178), "BI systems combine data gathering, data storage, and knowledge management with analytical tools to present complex and competitive information to planners and decision makers."

Moreover, Azvine (2006, p. 29) defines BI as follows: "Business Intelligence is all about capturing, accessing, understanding, analysing and converting one of the fundamental and most precious assets of the company, represented by the raw data, into active information in order to improve business". Figure 1 depicts the architecture of a BI system.

Fig.1. BI system components



Source: Vercellis C., 2009, p. 10.

Before tackling the different components of the BI system, a distinction between some terms has to be done. In fact, Knowledge and information are not synonymous, nor are information and data. Yet there exists a relationship between these three concepts. Data is the raw material of organizational life; it consists of disconnected numbers, words, symbols relating to the events, and processes of a business. After some activities of extraction and processing, this data leads to information which appears meaningful for those who receive it in a specific domain. Thus, information is "organized data". Then, information is transformed into knowledge when it is used to make decisions and develop the corresponding actions. Therefore, knowledge consists of information put to work into a specific domain, enhanced by the experience and competence of decision makers in tackling and solving complex problems. Knowledge is an "integrated information" (Michalewicz Z., Schmidt M., Michalewicz M. and Chiriac C., 2007, p.4).

2.1 Data Sources:

It is necessary to gather and integrate the data, which are generally heterogeneous in origin and type, stored in the various primary and secondary sources. According to figure 2, data may be categorized, by its type and source, into structured or semi-structured and internal or external.

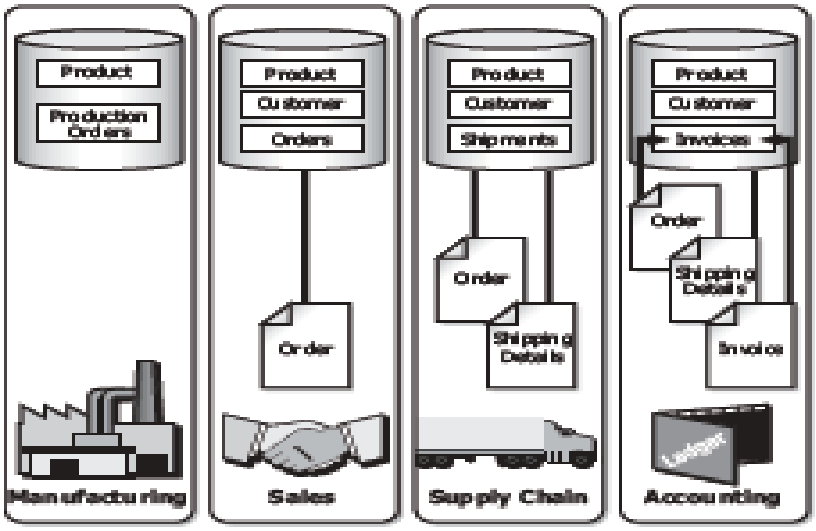
Fig.2. BI data type/source matrix

SOURCE / TYPE	INTERNAL	EXTERNAL
STRUCTURED	ERP	CRM
SEMI-STRUCTURED	BUSINESS PROCESSES	NEWS ITEMS

Source: Negash S., 2004, p. 182.

First, ERPs known also as operational systems or transaction processing systems are, principally, designed to address the problem of information fragmentation or "islands of information" in business organizations. They provide the foundation for effective supply chain management and e-commerce by developing plans and schedules so that the right resources—manpower, materials, machinery, and money—are available in the right amount when needed. Figure 3 shows the different operational tasks, within an enterprise, from which the operational system may record data.

Fig.3. Operational systems record data from operational tasks



Source: Hawson C., 2008, p. 22.

It is an information system that supports and integrates all facets of the business processes. A typical ERP system integrates all the functions of a company through the free transfer and sharing of information, which is centralised in one single relational database accessible by all modules. Thus, eliminating the multiple and/or duplicate entries of the same data will contribute to the improvement of this last.

Second, CRM is best described as a three-layered collection of operating philosophy (organizing the firm in more customer centric ways), processes (best Practices for managing and integrating sales, service, and marketing processes), and technologies that help companies improve their sales, service, and marketing operations (Bligh & Turk, 2004, p. 6). Yet, a commonly accepted business-oriented definition of CRM from research firm Gartner is as follows: "CRM is a business strategy that maximizes profitability, revenue and customer satisfaction by organizing around customer segments, fostering behaviour that satisfies customers and implementing customer-centric processes. To achieve the long-term value of CRM, enterprises must understand that it is a strategy involving the whole business, and thus should be approached at an enterprise level." (Bligh & Turk, 2004, p. 7). According to Dyche (2001, p10-11), CRM has two levels. The Operational CRM, also known as "front-office", involves the areas

where direct customer contact occurs. These interactions are known as customer "touch points". The Analytical CRM, also known as "back-office" or "strategic" CRM involves understanding the customer activities that occurred in the front office.

Third, as far as the semi-structured data sources are concerned, Negash (2004, p. 184) has briefly explained them through the following categories:

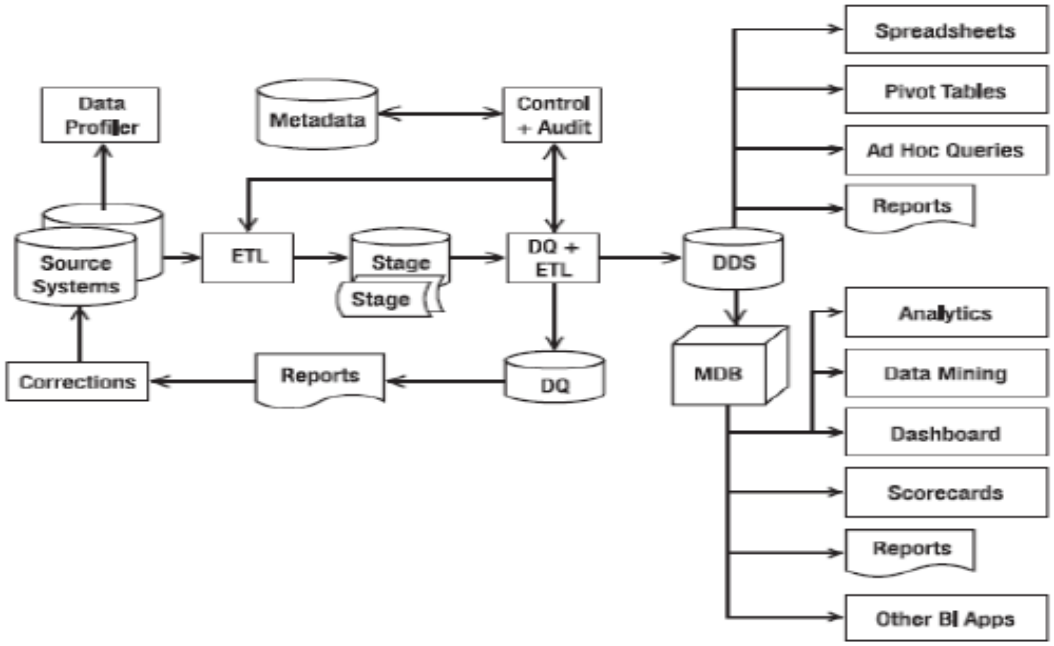
- Business function model: It is the hierarchical decomposition of organization's business. It shows what the organization does.
- Business process model: It represents the set of processes implemented to accomplish the business functions. So, it shows how the organization performs its business functions.
- Business data model: It depicts the data objects, the relationships connecting these objects based on actual business activities, the data elements stored about these objects, and the business rules governing these objects; it shows what data describes the organization.
- Application inventory: It represents the accounting of the physical implementation components of business functions, business processes, and business data and shows where the architectural pieces reside.
- Metadata repository: It is a description of the business models details. Its role is to support metadata capture and usage.

2.2 Data Warehouse:

Data warehousing is the process of taking data from transaction database systems and transforming it into organised information in a user-friendly format to encourage data analysis and support fact-based business decision making. A data warehouse is the foremost repository for the data available for developing BI architectures and decision support systems.

According to Bill Inmon, "A data warehouse is a subject-oriented, integrated, time-variant and non-volatile collection of data in support of management's decision making process."(Imhoff, Galemmo, and Geiger, 2003. P13). Another definition given by Ralph Kimball states that:"A data warehouse is a system that extracts, cleans, conforms, and delivers source data into a dimensional data store and then supports and implements querying and analysis for the purpose of decision making.", (Kimball, and Caserta, 2004. P.23).Figure 4 illustrates the simplest form of a data warehouse system.

Fig.4. Simplest form of a data warehouse system



Source: Rainardi V., 2008, p. 2.

The source systems are the Online Transaction Processing (OLTP) systems that contain the data to be loaded into the data warehouse. The OLTP is a system whose main purpose is to capture and store the business transactions. The source systems' data is examined using a data profiler to understand the characteristics of the data. The extract, transform, and load (ETL) system brings data from various source systems into a staging area. Then, it integrates, transforms, and loads the data into a dimensional data store (DDS). Next, the data quality rules do various data quality checks. Bad data is put into the data quality (DQ) database to be reported and then corrected in the source systems. Bad data can also be automatically corrected or tolerated if it is within a certain limit.

Actually, users use various front-end tools such as spread sheets, pivot tables, reporting tools, and SQL query tools to retrieve and analyse the data in a DDS. Some applications operate on a multidimensional database format. For these applications, the data in the DDS is loaded into multidimensional databases (MDBs), also known as cubes, where the data is stored in cells and the position of each cell is defined by a number of variables called dimensions. Each cell represents a business event, and the values of the

dimensions show when and where this event happened.

However, regarding data integration, two primary methods are used: data federation and consolidating data (Ballard, 2005, p. 41).On the one hand, federated access involves breaking down a query into subcomponents, and sending each subcomponent for processing to the location where the required data resides. On the other hand, Data consolidation combines data from a variety of locations in one place, in advance, so that a query does not need to be distributed. Moreover, data federation is provided by enterprise information integration (EII) software, while data consolidation can be implemented using ETL and data replication. Both data federation and data consolidation may require underlying data mapping and data transformation. Mapping describes the relationships between required elements of data, while transformation combines the related data through this mapping.

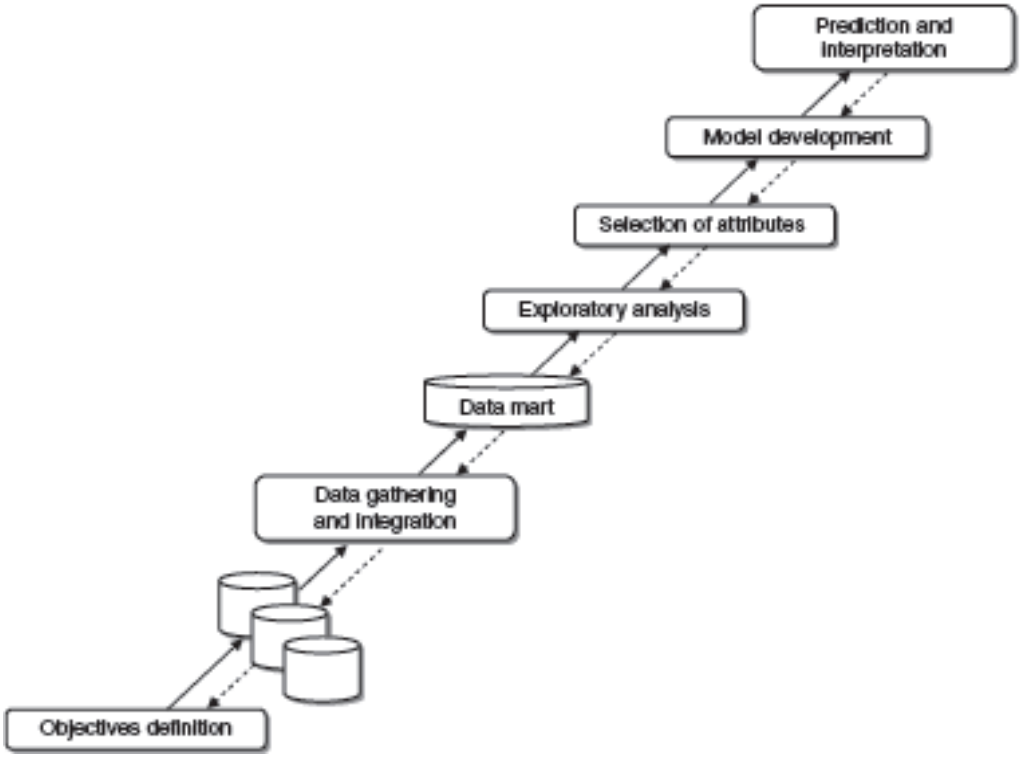
In any way, the goal of any data warehouse or data mart project should be to create a single version of the truth for data within the enterprise.

2.3 BI Methodologies:

This stage deals, mainly and namely, with the exploratory data analysis and data mining techniques; then moves to the optimization and finally the decision-making.

The primary purpose of exploratory data analysis is to highlight the relevant features of each attribute contained in a dataset, using graphical methods and calculating summary statistics, and to identify the intensity of the underlying relationships among the attributes. However, Data mining is the process of selection, exploration, and modelling of large quantities of data to discover regularities or relations that are at first unknown with the aim of obtaining clear and useful results for the owner of the database (Giudici, 2003, P2). Data mining activities can be subdivided into two major investigation streams, according to the main purpose of the analysis: interpretation (to identify regular patterns in the data) and prediction (to anticipate the value that a random variable will assume in the future or to estimate the likelihood of future events). Figure 5 summarises the data mining process.

Fig.5. Data mining process



Source: Vercellis C., 2009, p. 85.

The difference between exploratory data analysis and data mining could be summarized in two points. From the statistical viewpoint, exploratory data analysis essentially uses descriptive statistical techniques, while data mining can use descriptive and inferential methods that are based on probabilistic techniques. Regarding the purpose of each, the exploratory analysis aims at describing the structure and the relationships present in the data, for eventual use in a statistical model. Whereas, the purpose of a data mining analysis is the direct production of decision rules based on the structures and models that describe the data.

After the analysis phase comes the optimization which provides tools for making optimal and best decisions. The term decision-making process has been derived from Herbert A. Simon, who compared the preparation of the final crucial decision in an organization to a river fed from many different sources. "A complete decision is like a great river, drawing from its many tributaries the innumerable component premise of which it is constituted.

Many individuals and organizational units contribute to every large decision, and the problem of centralization and decentralization is the problem of arranging this complex system into an effective scheme" (Menne-Haritz, 2005, p.15).

Actually, there are many different models that can be used through the decision making process, among which the following can be mentioned (Sanderson C. and Gruen R., 2006, p. 22.):

• Game-theory models for decision making under 'uncertainty', that is when the future values of the relevant exogenous variables or 'states of nature' cannot be estimated, even in probabilistic terms.

• Decision analysis models for when probabilities can be attached to each potential future value of the relevant exogenous variables or 'state of nature'.

• Programming models for estimating the effects on efficiency of changes in the way mixes of resources are allocated to tasks.

• Costing models for predicting the effect on costs and performance of changing factors such as case mix and service capacity.

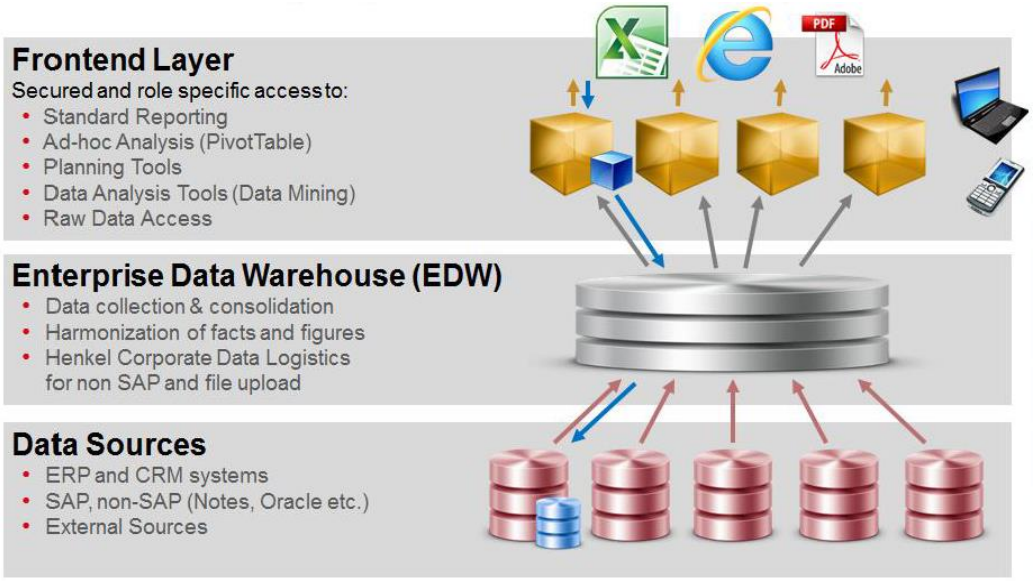
• System dynamics models for predicting how the effects of decisions will unfold over time, particularly when there may be vicious or virtuous circles of cause and effect, leading to stable or unstable behaviour of the system as a whole – or parts of it.

• Queuing models for where the rate of arrival at an interconnected system of services, or the service times themselves are irregular. These models provide estimates of the effect on measures of performance (waiting times, occupancy) of changes in service capacity or scheduling arrangements.

3. Business Intelligence within Henkel:

As demonstrated in figure 6, the data sources, particularly SAP ERP, constitute the first step in Henkel's BI system. Indeed, Data Warehousing and CRM are included with SAP as modules. In the second step, there is SAP-BW (Business Warehouse) where data is collected and consolidated and the KPIs are harmonised. Finally, after analysing data, reports have to be delivered to the decision makers.

Fig.6. Henkel BI target architecture



Source: Internal document

3.1 SAP:

SAP consists of several application components closely integrated with one another. The major application areas are: accounting (including financial accounting/controlling, financial SCM and project systems), human resources (including personnel management, time management, payroll and travel management), and logistics (including materials management, production, plant maintenance, sales and distribution, logistics execution, etc.).

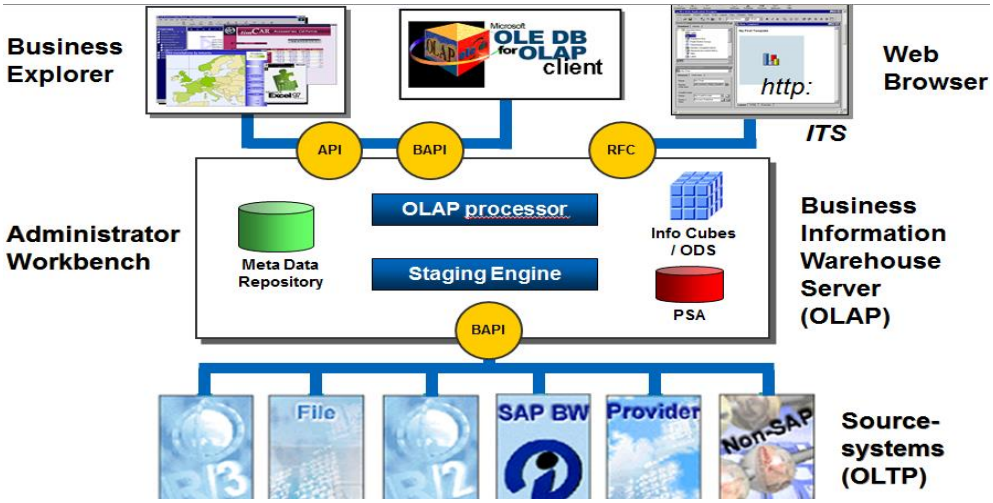
Several advantages are offered by SAP. For example, it can present the company performance status in a glance, by gaining insight into business operations at every level. It permits the monitoring of the most important KPIs in the company. It provides consistent and reliable data on any level of details using the root cause analysis. Moreover, SAP is convenient and easy to handle for all users. It empowers employees with timely, relevant, and trustworthy information. It facilitates the retrieval of information from mass data quickly through a simple analysis of transactional mass data. It helps to identify trends and variances. It allows simple report generation; therefore, it enables users to get results instantly. Last but not the least, it minimizes

reliance on Information Technology (IT) for reporting, analysis, and dashboard needs.

3.2 Business Warehouse:

The Business Explorer Analyzer is used to create and change queries in order to analyse data in Business Warehouse (BW), to navigate within reports and to call and save reports in user roles and personal favourites. Besides, it provides flexible reporting and analysis tools by integrating reporting functionality in Excel (additional toolbar in Excel). Figure 7 reveals the main elements of the Business Warehouse within the ERP System.

Fig.7. SAP-BW architecture:



Source: Internal document, Ben Van den hende, SCORE MENA, Key User Training Introduction and General Bex Analyzer Training, April 2008.

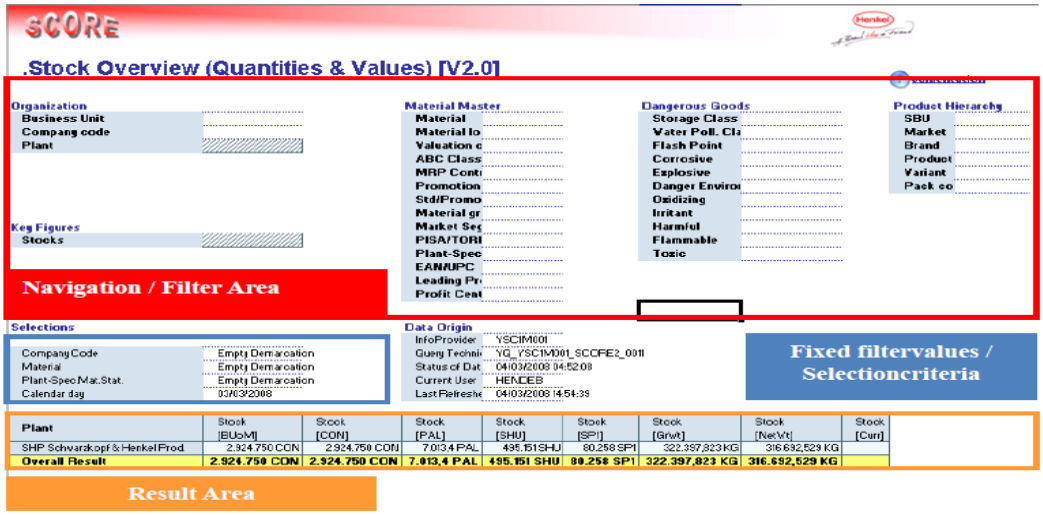
3.3 BI Tools at Henkel Algeria:

BI tools are considered models that help the users extract information, from SAP, and present them in a very efficient manner. Henkel Algeria uses some of them such as SCORE, GECCO, and COLOR.

First, SCORE, standing for Supply Chain Optimizing and Reporting, provides its users with five types of reports. First, activity analysis presents an overview of the main activity indicators such as the number of orders as well as the ordered quantity. Second, efficiency analysis gives an overview of the main efficiency KPI's. Third, service level deals with the different customer service levels. Fourth, complaint analysis gives an overview of the number of complaints. Finally, invoice/credit note analysis is similar to

activity analysis, but for billing documents. Figure 8 displays an example of the report structure.

Fig.8. SCORE report structure



Source: Internal document.

Second, GECCO, standing for Global Enhanced Consumer Controlling System, provides reports and analyses based on: invoices, credit notes, allowances, accruals, manufacturing cost, advertising, and last minute adjustments. Its reporting features are mainly: Excel-integration with BEx analyser, web-access, flexible navigation, automatic to Plan-Plan data-Integration (daily refresh), application-integration: web with MARS, iSales BW, BEx analyser with TOPAS, report distribution, separation from OLTP for performance reasons, and view on display as the smallest component. Figure 9 gives an idea about the GECCO data model.

Fig.9. Template of the GECCO data model

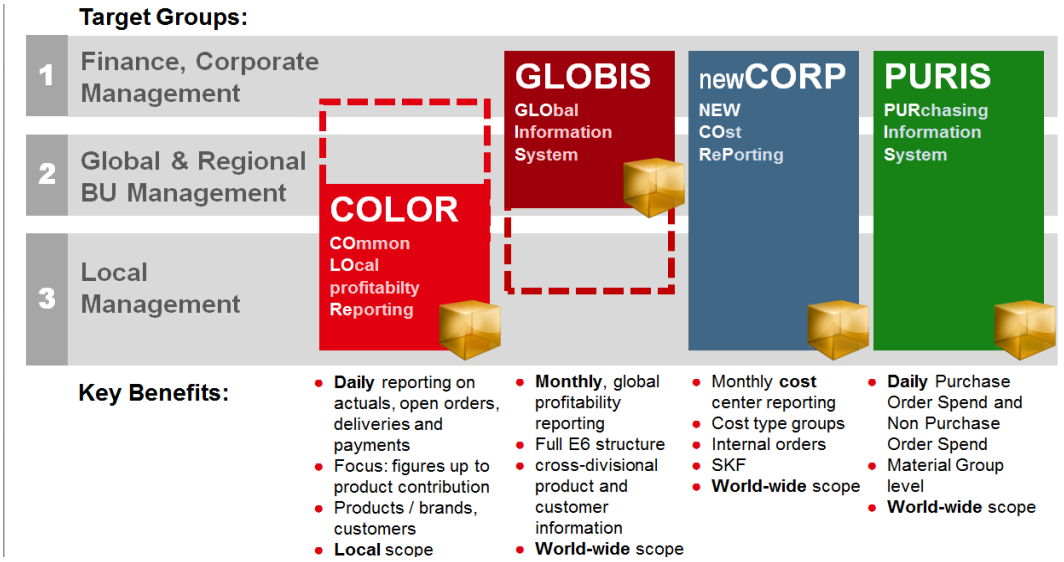
Attributes of GECCO			
Dimension	**Attribute**	**Example**	
		Code	**Description**
Organisational data	Company	2090	Henkel Trading Egypt
	Sales Organization	3524	EG - HTE - Kos.
	Profit Center	0001/857035	KOS MA BODY/FRAGR.
Article	SBU	K2	Body
	Overall Market	K6	Body Care
	Market	K20	Soap
	Market Segment	K63	Soap Bars
	Umbrella Brand	K74	Fa/Fa Men
	Brand	K77	Fa
	Sub Brand	K98	Fa Classic
	Product	052101200001	FA Soap *
	IDH Prod. Hierarchy	052101200001900615	mix 110 g
	Smallest Unit	000000000001155914	Fa Soap110gm×12Cltd 4 for 5EGP
	Variant	05900	mix
	Pack Content	05615	110 g
	Article	1155914	Fa Soap110gm×12Cltd
	Alternative ID	#	Not assigned
	Promopack	0	No
	EAN	6221143013861	
	Display Type	OO	Others/Others
Customer	Sold-to party	984026	Sofico Pharm
	Ship-to party	984026	Sofico Pharm
	CustGroup 1 (Sold-to	#	Not assigned
	CustGroup 2 (Sold-to	#	Not assigned
	CustGroup 3 (Sold-to	0022300024	EG-Cosmetics Nodes
	CustGroup 4 (Sold-to	0022300025	EG-Node Pharmacies
	Country (Ship-to)	EG	Egypt
	Country (Sold-to)	EG	Egypt
	Int./Ext. (Sold-to)	0	3rd party
	Export Ind. (Sold-to	2	Domestic
	Channel (Sold-to)	#	wholesaler
	Channel (Ship-to)	#	wholesaler

Source: Internal document

Third, COLOR, standing for Common Local Profitability Reporting, is one of the projects aiming at the consolidation of redundant BI applications to reduce cost and obtain consistent reporting across Business Units. COLOR offers information on a daily base relevant for the steering of local business worldwide in a harmonised way regardless of the business unit to users mainly in: Local Sales, Local Marketing and Local Controlling.

Additionally, COLOR has other defining paybacks. It provides KPIs that are needed to answer business questions related to local steering needs. It is updated day by day on daily data. It reduces the number of tools since controlling, sales and marketing work on the same data with the same tool. It uses only Excel instead of several reporting tools. It is more flexible and less IT needed. It assures faster reporting and it is less costly on the long run. Figure 10 demonstrates COLOR's objective and positioning in the global BI strategy of Henkel.

Fig.10. Objective and positioning in the global BI strategy



Source: COLOR User Manual V1.3.doc

4. Conclusion:

So, BI enables businesses to access, analyse, and use their data for decision-making. BI is especially required in business planning as well as in execution.

First, business planning is an area that is concerned with strategic issues such as increasing revenues, reducing costs, and deciding what new products and services should be introduced. This is where strategic business intelligence is used. If, for example, the business goal is to maximize product sales, then the BI system needs to provide executives with information about what products sell best, in what locations and for what price, who the competition is, and what is the impact of advertising. Easy-to-use dashboards are mainly used to show executives the gap between the actual business performance and the business goals. Therefore, it helps executives identify ways of improving long-term business performance.

Second, the execution area focuses on day-to-day operations of the company. It is concerned with developing and executing efficient business processes. BI helps improve business execution through monitoring workflow and reporting operational results. On the other hand, BPM enables a BI system to tap into business events flowing through business processes. This data is used by BI applications to create actionable management

information, which enables BPM, such as: key performance indicators (KPIs); alerts; analytic context reports and recommendations for corrective action.

Indeed, as an answer to the main research question: *"What effects does BI have on business performance?",* it could be said that BI has a great impact on business performance especially in terms of lowering costs; increasing revenue; and improving customer satisfaction.

First, BI helps the company to lower its costs by being operationally efficient –the fact of giving customers the access to real-time data enables them to track their own accounts therefore improve their satisfaction. In addition, it participates in eliminating reports blockage and delays; negotiating better contracts with suppliers and customers –thanks to a solid grasp of facts and figures; finding root causes and take action and identifying wasted resources and reduce inventory costs.

Second, BI contributes to increase one company's revenues. This may happen thanks to better strategies with a better marketing analysis. Using BI, companies can micro segment their markets and gain an edge over the competition. Moreover, by analysing the sales force selling patterns (results vs. targets); better results can be achieved through encouraging it to focus on high profitability customers and products.

Third, BI plays a part in improving customers' satisfaction. Actually, BI, with access to information and without having to escalate and intensify standard problems up the management hierarchy, gives users the means to make better decisions. Additionally, it provides quick answers to user questions. Furthermore, it challenges assumptions with factual information.

As far as Henkel is concerned, the company has adopted BI, especially, to: offer cross-divisional information for its international customers; assessing brand performance world-wide; identify cost driver, synergies and growth potential across geographies; allowing ex-post visibility of results for any business transaction; increase Henkel business effectiveness; and providing a fast, flexible, user friendly and cost competitive BI architecture.

Table.1. BI Added-value

Status before BI programme	To be afterwards
• Various, partly redundant applications. • No efficient worldwide reporting capabilities • High costs (especially regarding expected SAP policy) • Performance issues and weak user interface	• Consolidated system landscape with focus on information • Worldwide reporting systems and common standards • Reduced costs regarding the whole BI landscape • High performance and user-friendly front-end

Table 1 recapitulates the major differences between a situation where BI is absent and another where BI is implemented.

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