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**International Business and Data Analytics**

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“Justifying the use of business intelligence and data analytics as a Data Analyst Consultant at Dataville Marketing company.”

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**1.0 Introduction**

Dataville Ltd. is a multinational corporation with a global presence, doing operations in many nations worldwide. The company's headquarters are in the United States of America. The company is involved in the production of many product categories, including automobiles & accessories, fashion items, electronics, and home and furnishing products. These categories are further classified into consumer, corporate, and home office market segments.

In the fiscal year of 2015, the company achieved a cumulative sales revenue of $8,023,381.00, resulting in a profit of $3,729,902.95. This data signifies a profit margin of 46%.

**1.1 Problem statement**

In the year 2015, the company encountered a decline in sales amounting to $394,738.00 within one of its key markets the electronic product category, representing a proportion of 5% in relation to the overall sales distribution across various product categories. The underperformance has had a detrimental impact on both the projected sales revenue and the profit anticipated by the management for the fiscal year. The company, nonetheless, exhibits a strong determination to augment the sales income of the electronic product category by 25%, with the objective of attaining a sales revenue of $2,005,845.25 for the upcoming year. The firm intends to use business intelligence (BI) to effectively monitor, manage, regulate, and optimise the sales performance and activities of the enterprise.

**1.2 Objective of the study**

This study seeks to examine the potential impact of business intelligence (BI) on the business and sales performance of the organisation. Specifically, it focuses on the utilisation of a performance-based dashboard system for monitoring and tracking purposes. The study will additionally examine the ways in which business intelligence (BI) can assist management in making informed decisions regarding the business performance of the organisation, ultimately resulting in enhanced sales and reduced costs.

**1.3 Methodology**

The study will adopt the Data Analytics Life Cycle methodology. The study utilises datasets consisting of 51,290 data records pertaining to the 2015 sales transactions of the company. The datasets were acquired from Kaggle and afterwards examined with a Pivot table within the Microsoft Excel Business Intelligence framework. The usage of Key Performance Indicators (KPIs) and the production of data visualisations was enabled through this study, ultimately leading to the presentation of data on a performance-oriented dashboard (Eckerson, 2006). The objective of these visualisations was to facilitate a more profound comprehension of the study being conducted and to augment users' understanding.

**2.0 Theoretical Framework**

2.1 Competitive intelligence

Sales depend on an organization's knowledge about competitors, markets, and products. Makame et al. (2014) say e-commerce is evolving quickly. It altered business models, market dynamics, and market structures (Al-Hawari, 2011). This technology gives organizations a detailed view of online product usage. This shows how companies may reward customers. Because e-commerce is more efficient, commercial transactions require less time. Websites promote goods and services and simplify ordering and tracking (Huang et al., 2015).

2.2 Business Intelligence.

Due to the growing relevance of information intelligence inside and outside businesses, modern organisations have substantially invested in business intelligence systems (Hou, 2012). Company intelligence (BI) uses data from different sources to assist companies understand dynamics and make better decisions (Aruldoss et al., 2014). Business Intelligence (BI) analyses primary or secondary data to know competitors (Jaworski, MacInnis & Kohli, 2002, p. 304). It is essential to strategic marketing decisions and market-oriented organisation growth (Jaworski et al., 2002, p. 279). The corporation can make organisational decisions via mobile, web, and email (Gao and Xu, 2009). Management needs quick communication routes.

2.2.1 Business intelligence framework

According to Kemper and Baars (2006), the Business Intelligence Framework consists of three distinct levels that are organized in a hierarchical fashion. The data layer, the logic layer, and the access layer are all included in the components.

Data layer

ETL-extracted sustainability data from multiple data sources is stored in the institutional data warehouse (Muntean et al., 2013). Inmon (2005) says data warehouses with data marts improve searching and analysis. The data layer consolidates data marts to increase quality and consistency and save money.

Logic layer

The Logic Layer helps analyze organized and unstructured data, enabling the effective distribution of pertinent knowledge. OLAP and data mining are among the Logic Layer's analytical functions. The Logic Layer compiles, processes, and delivers data for management decision-making (Kemper et al., 2000).

Access/Visualization Layer

Data Access Layer connects Logic Layer components and capabilities and displays them coherently and customized. The "portal systems" deploy this layer. Portals combine multiple information and application systems into one interface (Davydov, 2001). IBM describes data visualization as charts, graphs, infographics, and animations. Complex data interactions and insights are simplified by these visualizations. Data visualization isn't for data teams. It helps data analysts and scientists uncover and explain patterns and trends, while management utilizes it to indicate organizational hierarchy.

A diagram of a business process

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Business intelligence framework and integration approaches

Adapted from An Integrated Business Intelligence Framework (2023)

**3.0 Data Analysis**

Data analysis involves acquiring, modelling, and analyzing data to improve decision-making, according to McFedries (2018). Deloitte's 2021 data analytics report defines data analytics as capturing, managing, and analyzing data to drive company strategy and performance. It ranges from retrospective analysis to prospective planning and forecasting.

3.1 Data Analytics Framework

The study will adopt the data analytics life cycle methodology outlined below in order to effectively apply business intelligence (BI).

A diagram of a data analysis process

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Data Analytics Life Cycle.

Source: Adapted from the Data analytics Lecture note (2023)

3.1.1 Discovery

Given the low sales of the electronic product category, the company has pledged to increase sales by 25% in the coming year. The company plans to use business intelligence (BI) to achieve its goals. This implementation will help the company manage, monitor, and regulate sales, increasing sales revenue.

3.1.2 Data preparation

The company's 51,290 data records from Kaggle, an online data firm, were downloaded and saved on the computer system to examine its performance in 2015. Microsoft Excel was used to model the data. Several measures were used during data modelling to ensure complete, analysed, and unambiguous dataset knowledge. Some steps are,

Data Filtering

The Excel application during pivot table analysis restricted the analysis of profit margin, sales revenue, sale volume, and countries to “top ten ” for convenience of presentation and analysis due to the enormous volume of data records.

Field deletion

Due to the enormous volume of data records, some columns in the working sheet of the datasets were deleted. The columns include, The order Id, order date and shipping date, shipping mode, order priority shipping cost, Customer id, City, Customer name, and Aging. In addition, the columns were also deleted because they are not relevant to the study and the objective of the analysis we want to achieve.

Field modification

The working sheet sales column was renamed ‘sales revenue’. The quantity column was changed to sales volume, while the profit column was changed to operating profit. This action encourages dataset examination and thoughtful reflection to elevate visualisation.

Creation of field columns

The profit margin column was added to the dataset's working sheet to show revenue left after operating expenses. The operational profit margin was calculated by dividing operating profit by sales revenue and multiplying by 100. The datasets working sheet now includes a cost of goods column for commodities. Its goal is to show production costs. The cost of products was estimated by deducting operating profit from sales income. To illustrate product costs, the dataset working sheet includes a cost price column. This measure shows the mean cost price of sold products. The cost price of a product was calculated by dividing sales income by the quantity sold.

The cell row has no duplicate or missing values during modelling. However, several field columns were changed to improve dataset presentation and comprehension.

After the preceding steps, the datasets were stored in the system and a pivot table was constructed on Excel using the insert command.

3.1.3 Model Planning and Building

Microsoft Excel pivot tables were created to analyse datasets based on Key Performance Indicators. We evaluated key performance indicators (KPIs) from the datasets most relevant to the study's aim based on management's strategic plan. A pivot table was used to analyse and visualise important performance characteristics such as profit margin, sales revenue, country, product categories, market segment, cost of goods, sales volume, sales discount, and product subcategories. The data were presented using visual charts and an interactive dashboard with slicers. Business intelligence (BI) helps decision-makers assess the problem and make the best choices (Sharda, Turban, and Delan, 2014).

3.1.4 Communicate results and operationalise.

After validating the output and creating an Excel dashboard for key performance indicator data, the procedure is complete. Slicers made the dashboard interactive. This helps management comprehend the situation and make decisions quickly.

**4.0 Dataville Business Intelligent System Dashboard**

The 4.0 Figure The firm dashboard, which is used for the purpose of monitoring and tracking the operational efficacy of the organisation, is shown below. This helps with the creation of well-informed assessments, which is the goal of using the dashboard.

**A screenshot of a computer

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Dataville Sales Performance Dashboard

Fig 4.0: Dashboard system. Source: (own work)

4.1 Dashboard Justification

The dashboard displays key sales indicators and statistics, providing valuable insights into business performance. The sales dashboard can help managers and decision-makers evaluate and improve sales performance using key performance indicators (KPIs) (Ong et al., 2011). Furthermore, the sales dashboard is projected to improve sales performance, operational efficiency, and strategic decision-making (Sharda, Turban and Delan,2014) by providing vital information. The benefits justify adopting this solution as a key tool for the organisation to improve sales processes and achieve a long-term goal.

4.1.1 Operating profit margin of the Top Ten countries

Fig .4.1.1: Profit Margin of the Top ten countries. Source (own work)

The column bar chart in Fig 4.1.1 shows the top 10 countries' profit performance. Revenue after operating expenses is the operating profit margin. Tunisia has the highest profit margin at 60%, followed by South Sudan at 54%. Belarus and UAE performed lowest with 47% and 48%. This information will assist management to identify high-performing countries, assessing product category sales performance in each country, and identifying business areas where sales can be increased, and costs decreased to increase profitability. Due to the massive data records, the analysis only included the top ten nations.

4.1.2 Sales Revenue of Top Ten Countries

Fig .4.1.2: Sales Revenue by Top Ten Countries. Source (own work)

The column bar chart in Fig 4.1.2 shows the average sales income of the top 10 countries. According to the chart, Eritrea has the highest average sales revenue with $219.50, while the least countries are Mozambique and Uzbekistan with $171.80 and $170.40 respectively. With this information, management can determine which countries generate the most and least sales revenue. Management can use this data to improve sales in countries with low sales through marketing and cost-reduction strategy. However, due to the massive data records, the analysis only included the top ten nations.

4.1.3 Sales Proportion by product categories

Fig 4.1.3: Sales Proportion of the Product categories. Source (own work)

The sales performance of each product category is shown as a proportion in the pie chart in Fig 4.1.3 above. According to the graphic, the product category with the highest growth rate is fashion, with 65%, while the category with the lowest growth rate is electronics, with 5%. This information will be helpful to management in determining which aspects of the product category's business have contributed badly to the product category's overall sales. The information will be helpful to management in carrying out marketing strategies to enhance sales, such as increasing sales discounts, product development, and a pricing approach reduction strategy.

4.1.4 Sales Revenue by Market Segment

Fig. 4.1.4: Sales Proportion by Market Segment. Source (own work)

Figure 4.1.4 presents a Donut Pie chart that illustrates the success of several product market sectors. According to the depicted data, the home office market category exhibits the lowest performance rate at 18%, while the consumer goods category demonstrates the highest performance rate at 52%. This information will assist management in selecting a market segment for its strategic approach by means of doing market research. Therefore, this data will assist management in formulating strategies for increasing sales of home office products and improving the sales of other product categories.

4.1.5 Sales Volume of the Top Ten Countries

Fig .4.1.5: Sales volume of the Top Ten countries. Source (own work)

The 2015 sales volume column bar chart in Fig 4.1.5 shows country sales. The US has the highest sales volume at 30,024, compared to other countries with low sales like India, Indonesia. This data will help management determine which product categories and subcategories drove US sales volume above other countries and why. Management can plan marketing and resource allocation to enhance sales in low-volume markets with this information. The massive data records confined the study to the top ten countries.

4.1.6 Cost of Goods of Good by Product Categories

Fig .4.1.6: Cost of Goods by product categories. Source (own work)

The column bar chart in Figure 4.1.6 shows the mean cost of manufacturing a single product quantity across multiple product categories. Fashion products cost $88.65, the most of any category, according to the report. The lowest cost is home & furniture product with $70.99. The data will help management discover product category businesses that need cost reduction and operational efficiency. Sales revenue and business profitability will grow with this metric.

4.1.7 Sales Discount by Product Categories

Fig .4.1.7: Sales discount by product categories. Source (own work)

The column bar chart depicted in Figure 4.1.7 illustrates the sales discount for each product category. According to the chart, the fashion category exhibits the highest sales discount, amounting to $923.47, whereas the electronics category demonstrates the lowest discount, totalling $80.67. One may argue that the diminished sales in the electronic product category can be attributed to comparatively inferior sales deals in comparison to other product categories that exhibit greater sales figures. For instance, the LCD and keyboard products had 0.03 and 0.01 respectively. This may have contributed to the low sales of the products. This information will therefore aid management in assessing the necessity of implementing additional sales discounts and other marketing techniques across all product categories, with particular emphasis on the electronic product, which exhibits readily observable impacts on sales turnover.

**5.0 Conclusion and Recommendation**

The research has offered guidance regarding the utilisation of big data in the process of decision-making (Kopanakis, Vassakis and Mastorakis, 2016). The company has implemented a data-driven decision-making model for business performance through the implementation of a dashboard intelligent system. This model relies on data analysis through a business intelligence framework. The objective is to enhance the company's efficiency, boost sales performance and profitability, and ultimately improve its overall market share.

The report proposes the following recommendations:

1.The company should consider cost reduction in the electronic product categories within the corporate segment market, especially the LCD, and keyboard categories where cost is relatively high and has affected the rate of demand for the products in Mozambique and in the US. Additionally, enhancing the supply chain process and procuring raw materials and components in large quantities can potentially result in discounts from suppliers. Furthermore, expanding the scale of production can contribute to the decrease in average production costs.

2.Implementation of the company's marketing plan, particularly through the augmentation of sales discounts on the electronic product category, is recommended. The LCD and Keyboard products’ sale discount is currently low at $0.03 and $0.01 respectively and may have contributed to low sales of the products.

3.Implementation of a business intelligence system performance dashboard (Eckerson,2006) is recommended for the organisation, as it would enable the monitoring, tracking, and management of sales and marketing activities. This would ultimately lead to improved sales, cost reduction, and increased profitability.

4.It is recommended that the corporation explores the option of utilising and/or increasing an E-commerce channel to facilitate the sale of its products through online website sales (Huang et al., 2015). This measure will contribute to a reduction in selling expenses.

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