

Impact of Data Analytics on Operations Success of Apparel Sector ABC Clothing Pvt Limited (Sri Lanka)

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ABSTRACT

This research mainly targeting to identify how adopting data analytics will help to improve operational efficiency of apparel sector (ABC Clothing-Sri Lanka). Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. [1] Operational efficiency is primarily a metric that measures the efficiency of profit earned as a function of operating costs. [2]

researches related to Data analytics in garment and textile sector efficiency of operational functions have only few researches. To narrow down the scope researcher chose one organization which currently won best exporter award 2021 in medium scale. This organization is currently looking for a digital transformation.

Research is conducted by choosing a population of 120 from most important operational functions of the garment factory. Population was chosen via snow balling method. Since qualitative method is more time consuming and less samples can be tested quantitative method is chosen.

According to the literature review Data analytical tools, Data quality and data availability are few independent variables of data analytics which are impacting operational efficiency (dependent variable) of an organization. Pearson correlation was tested to identify the relationship between dependent variable and each independent variable and outcome is a positive relationship.

Regression analysis was done to identify how much all independent variables (Data analytical tools, Data quality, data availability) together impact on the dependent variable. Results demonstrated that employees are not satisfied with Real time data availability of their divisions and employees pointed out what are the qualities they need in data analytical tools when considering new tools for digital transformation Company is looking for. Employees have pointed out the qualities and level of quality of data they think which organization already have.

Keywords

Data analytical tools, Data quality, data availability, operational efficiency

1. INTRODUCTION

The apparel, textile and fashion industries are changing rapidly and developing strongly around the world. People's lifestyles are changing every day. As a result, the demand for textiles is changing rapidly. The global pandemic is having a huge effect on the supply chain of apparel sector. Global brands and retailers have canceled orders from their supplier factories, and many governments have imposed travel and meeting restrictions. Fashion trends and consumer

expectations are constantly changing, which is unpredictable given the global pandemic situation.

Garment sector employs 60 million people across the world, almost 75% of whom are women. According to the open information catalog of World Bank, the style enterprise has a worldwide populace of 7,260.7 million the workforce that directly supports textile production is 3,384.1 million, with a per capita GDP of \$ 16,300. [3]The EU, USA, and Japan are the largest importers of apparel in the world [4]. From these major importing countries, Sri Lanka mainly targets the United States, EU, Italy.

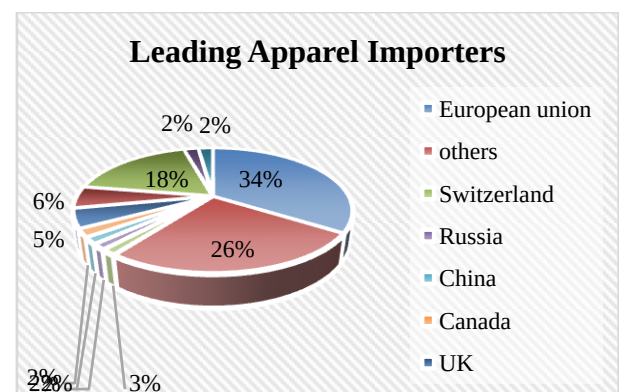


Figure 1 Share of leading apparel importers worldwide in 2019, by country

1.1 Sri Lanka's garment Sector and its contribution to the economy Sri Lanka

Apparel sector

garment industry is one of the most important economic drivers of Sri Lanka. According to statistics from the Sri Lanka Export Development Board, the Sri Lankan textile industry directly employs nearly 300,000 workers and indirectly employs nearly 600,000 workers. There is no discrimination in this sector. [5]Industry is the main source of income for Sri Lankan women. This export-oriented industry has been the country's biggest source of foreign exchange during the Covid pandemic, accounted for more than 40% of the country's total exports. Sri Lankan textile manufacturers and clothing companies have successfully capitalized on worldwide marketplace possibilities to enlarge past conventional and personal exports to supplying innovative and modern answers via innovative services, style BPO services, research, improvement and innovation.[6]

The contribution of the garment industry to Sri Lanka's economy is unmatched. This industry is Sri Lanka's largest exporter, accounting for 7% GDP of the country. This Sector accounted for 59% industry exports of Sri Lanka's of

US\$9.426 billion in 2019 (46.9% of total exports of the country). Sri Lanka's apparel sector has use the concept of clean production. they show their best form in Garment technology, including the first "green garment factory," in the world, cut energy and water consumption in half. These plants have become commercially sustainable through lean manufacturing practices that reduce investment costs and accelerate return on investment. suppliers and manufacturers of Sri Lanka have made a collective try to reduce their carbon footprint and make garment industry more sustainable and environmentally friendly. [5] Sri Lanka also complies with World Trade Organization (WTO) regulations. The local garment The industry emerges as an authentic source of reasonable wages for employees and combats exploitative factories and child slavery. Sri Lankan clothing is discrimination free, tailoring practices and child slavery. [7]

China is the world's export market leader in the garment industry. With a population of approximately 21 million, Sri Lanka's clothing exports amount to US \$ 4.6 billion. In fact, Sri Lanka has the second highest per capita garment exports in Asia after Cambodia. The clothing industry, defined by the Sri Lanka Export Development Commission as one of the major export industries, is projected to reach US \$ 8.5 billion by 2020. (HKTDC Research, 2022)

Table 2.1 Comparative Decomposition of Export Growth, 2008-12

Percent

Margin	Components of export growth	Bangladesh	India	Pakistan	Sri Lanka
Intensive	Increase of old products in old markets	263.2	100.6	110.4	120.1
	Decrease of old products in old markets	-159.9	-58.1	-70.4	-83.4
	Extinction of exports of existing products to existing markets	-29.9	-19.2	-33.2	-24.5
Extensive	Increase of new products in new markets	0.1	0.0	0.1	0.0
	Increase of new products in old markets	5.6	0.0	1.7	5.4
	Increase of old products in new markets	20.9	10.0	24.8	15.6

Note: The decomposition is first computed on a year-by-year basis over 2008-12 and then averaged for the period.

Figure 2 Comparative export growth of Asian counties

1.2 ABC Clothing Among other competitors

Sri Lankan apparel industry consists of more than 1,060 garment factories. This is consist of manufacturing giants such as MAS Holdings, Brandix, Hirdaramani Apparel, ABC Clothing, Foundation Garments.

ABC Clothing is a \$250 million company that provides sustainable apparel products, Established in 1992. The company closely works with Popular brands from designing to ship, intimate wear, sleepwear, baby, medical cloths, casual apparel etc. they have 11 factories in 3 countries and more than 15,000 employees worldwide. ABC Clothing is an industry leader in an ethical and sustainable working environment. It's a completely private company. ABC Clothing believes that strategic partnerships and collaborations play an important role in shaping the future. They facilitate mutual fertilization of ideas and help gain deeper market insights. Headquartered in Sri Lanka, Hela has 11 factories in Sri Lanka, Kenya and Ethiopia, with partner functions in Tanzania and Mozambique. It is also supported by design centers in Sri Lanka, the United States, the United Kingdom and France. ABC Clothing has now raised 4 billion rupees through an IPO to fund Sri Lanka's major growth initiatives and strengthen the company's balance sheet to support future expansion in Africa. They recently won the Best Exporter Award in the Midsize Apparel category. [8]

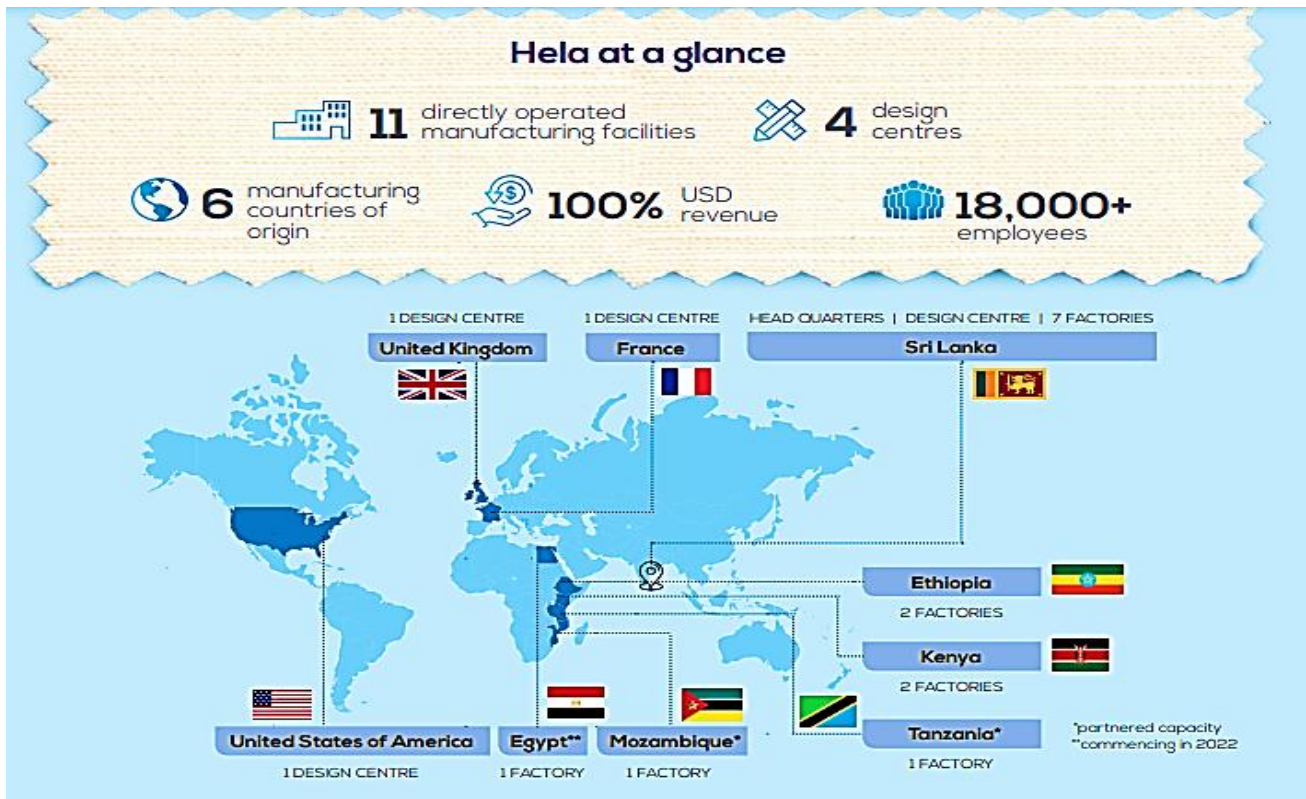


Figure 3 Company at a glance-(ABC Apparel Holdings Limited -Prospectus Invitation To Invest In The Initial Public Offering, 2020)

1.3 Research Problem Identification

1.3.1 Symptoms of the Problem

The current market is highly competitive and the business environment is unpredictable due to the Covid-19 pandemic. Spending money on data analysis tools is an investment, as companies can make a lot of profits in the long run by making decisions based on the quality information they collect. Big data is one of the major areas of knowledge and research that has had a major impact on an organization's digital transformation process in recent years. The main purpose of Big Data is to improve workflow by analyzing and interpreting large amounts of data. Data analysis enables effective marketing, better understanding of the audience, better customer service, more accurate budgeting and pricing, anticipating the needs and factors of business staff, and forecasting fashion trends.

ABC Clothing has now raised 4 billion rupees through an IPO to fund ABC clothing's major growth initiatives. All of these enhancements now recognize the importance of big data and trend analysis. At IPOs, they must always distribute dividends to investors. To take the first step towards digital collaboration, they recently made agreements with attune to implement SAP S / 4HANA® fashion and vertical business solutions. The SAP platform digitizes end-to-end processes and supports ABC's rapid growth. Attune Sri Lanka was a digital solution provider for apparel giant MAS inventory.8 recently they have split from MAS and collaborated with ABC clothing. This collaboration took place on June 28, 2021 and the project is currently in the implementation stage. [8]

Even before this huge investment they have collaborated with lot of information systems but after few years, digital transformation became unsuccessful due to few reasons such disability to overcome resistance to change from workforce,

gathering data but not considering to implement data analytical tools, not moving back up properly, not education or training is not adequate for the operational staff etc.

Most of the divisions rejecting to adopt to new technology. Employees resist change because they do not understand why change is happening and how it will affect them. They are in fear of unknown. they do not know how their day to day roles will be change. Some people are lack of job security because they think new implementations will eliminate their tasks. Even before implementation of SAP they have used lot of data management systems such as REAP, IFS Information system, MHICM to manage HR facilities etc. But all of them were used only in the beginning and after sometime work force reject it by pointing that using it is difficult.

The other problem is they use lot of different systems and management tools. each division use around 4 management systems for same task. As an example in finance one group use Navision to maintain their reports. while others use SAP /IFS systems to maintain same accounting records. most of systems are combined which each other but since versions are outdated and implementing team are not moving backups properly no one have a one whole idea about total finance function. In HR leaves will be maintained by one system, Finger prints and salary slips managed by other system, Human resources capacity, recruitment and other tasks will be managed by few other systems. even leave system and finger print system is not connected well and has lot of bugs.

gratuity prediction and other predictions about market changes is done by a third party research team. Third party team is customizing there reports and predicting all our future needs. but this is an unwanted huge expenditure. ABC clothing pay around 5,000,000 for this prediction requirements. but when listening to the meetings of these

research firms most of internal employees already know the facts they expose. because when they work on day to day activities they gather the knowledge.

1.3.2 Defining Research Problem

There is a problem of identifying sorting data which we already have. organization do not pay attention to use data we already have. due to this decision making is slow and outdated. ABC clothing currently spends huge money on third party research firms while company have all the data. Organization also stores all the data gathered from different systems by spending huge sum of money for servers. Only problem is no one pay attention how these stored data can create significant information, conclusions, and support for decision-making through validation, cleansing, transformation, and modeling. This is called big data analysis.

1.3.3 Research Question

How data analytics can be used in apparel sector operational excellence?

1.3.4 Objectives of the Study

- Identify how data analytics effect on operational efficiency in apparel sector
- Identify what are the specification organization should focus when buying analytical tools
- Identify the quality of data which organization already have
- Identify availability of data in the organization.

1.4 Significance of the Study

This is very important Contribution to ABC clothing because currently they are in the implement stage of a management system which is giving lot of analytical insights to organization. highlighting how the data gathered through this new implementation and another management system can have used to decision making and smooth operations will be helpful to organization so they can educate the work force and win resistance to change.

Due to Covid 19 pandemic all organizations have to spend huge overhead cost which cannot be eliminated to carry out operations (PCR tests, Insurance, Air lifting costs, huge shipping tariffs, daily operational costs for cleaning sanitizing, distributing dry rations to Covid infected employees). cutting cost paying for third parties to get predictions will save huge cost if we use our own data usefully and analyze patterns.

In global context very limited amount of researches conducted on this area. In Asian countries apparel industry is one of the significant contributor for the country's GDP. So conducting researches about improving operational excellence will be very useful and significant. In Sri Lankan context few researched were conducted with narrow scope, only choosing one division of apparel industry and checking ways to improve division via data analytics. none of the research papers pointed out how all main divisions can be linked and improved via data analytics.

researcher chose most important divisions and identify how data analytics will be useful for each division. Divisions are finance /HR/Designing/Supply chain / Marketing departments.

1.5 Limitations of the study

ABC clothing is a local multinational company. They have 11 factories around the world and have 8 factories within Sri Lanka. Since data accessibility to foreign offices are limited

and with the limited time frame I and will narrow down this research to Sri Lankan context. So identifying global data management needs wouldn't be fulfilled through this research.

In a garment there are at least 20-25 departments. (Marketing and business development, Design, Merchandising, Pattern Making, CAD, Sampling, Fabric Store, Trims and Accessory, Fabric Testing, Production Planning, Cutting, Sawing etc.). Most of this departments can use data analytics to improve the operations of the division. But with the narrowed scope this research will only focus on main operational functions because most research papers already focused on improving manufacturing efficiency. Since organization does not allow to publish their name for research researcher will conduct this research anonymously.

2. CHAPTER TWO – CRITICAL REVIEW OF LITERATURE

2.1 Big data and information

The practice of systematically applying statistical and/or logical approaches to describe, illustrate, generalize, and assess data is known as data analysis. Various analytical approaches "enable inducing inferences from data and provide the ability to distinguish between signals (phenomena of interest) and noise (statistical fluctuations) existing in the data," according to Responsible Research.[1]The act of reviewing, cleaning, converting, and modeling data in order to identify usable information, draw conclusions, and aid decision-making is known as data analysis. The fundamental purpose of data analysis is to find trends and solve problems by using statistical analysis and techniques to data. Businesses are increasingly relying on data analytics to analyze and shape business processes, as well as improve decision-making and business outcomes. [9]Data science teams use a number of data management techniques to provide comprehensive analytics, including data mining, data cleansing, data transformation, data modeling, and thus more. [10]

Big data consists of data collections which are not only huge, but also diversified and quick, making traditional tools and procedures challenging to manage. Due to the increasing expansion of this data, methods to handle and generate value and discoveries from big data sets should be developed and given. Furthermore, decision-makers must extract useful information from a wide range of fast changing data, ranging from daily transactions to consumer communication and social media data. Big data analytics, which would be the use of powerful analytical tools to large amounts of data, can give that value.[11]

Big data is powered by information. [12] Information is "data that is organized or classified, having values that are meaningful to the recipient". [13] Information is data that is processed based on decisions and actions.

For meaningful decisions, processed data must meet the following characteristics

- Availability - Information must be provided when it is requested.
- Accuracy - All information must be correct.
- Completeness - All details must be precise.

Process of Data Analysis

The phases of data analysis, which include acquiring all of the data, analyzing it, studying it, and using it to uncover patterns and other information, are referred to as the Data Analysis

Process. This procedure entails:

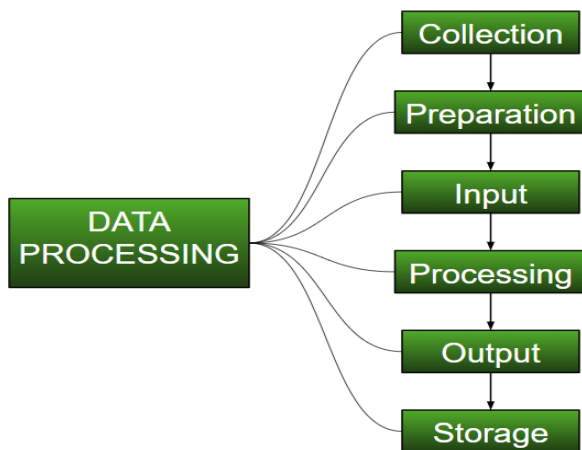


Figure 4. Data analytical process [26]

2.2 Data analytics vs. business analytics

Another subcategory of data analysis is business analysis. To make better business decisions, business analytics employs data analytics techniques of data mine, statistical analysis, and forecasting models. "A system for developing analytical models and simulations to generate scenarios, understand reality, and anticipate future situations," according to Gartner. [14]

There are four types of analysis:

Descriptive analysis: What's going on right now? Descriptive statistics detect trends and patterns in the present situation by combining historical and current data from many sources. [15]

Diagnostic Analysis: What is causing this? Diagnostic analysis is used to determine historical performance aspects or explanations using data (typically obtained by descriptive analysis). [16]

Predictive analytics: What does the future hold? Predictive analytics uses techniques like statistical modeling, prediction, and pattern recognition to create predictions about future outcomes based on the results of descriptive and explanatory analyses [17]

Prescriptive analytics: So, what exactly do you have to accomplish? Predictive analysis is a sort of analysis tools that uses testing and other techniques to suggest specific solutions that achieve the intended outcomes. [18]

2.3 Measurements of Data Analytics

2.3.1 Data analytical tools

A variety of analytical software tools available for the Big Data Analyst application are on the market to improve your organization's performance and make better business decisions that will help your organization succeed. Enterprises need to gain analytical insights into vast amounts of data in order to apply big data analytics that will definitely help them improve their performance. Columbus states: "87% of companies see ABDA as a tool to gain a competitive advantage over the next three years, Companies who do not embrace big data analytics are more likely to lose market share [19] ABDA is not only a technological advance, but also a fully functional paradigm [20]. Instead of intuition, business is founded on statistics and knowledge. Making a decision. [21]. Likewise, firms can obtain a comparative benefit and better fulfill their objectives by using an analytical

approach. [22]. To measure the performance of your data analysis tools, you may want to consider specifications such as data access and collection, data storage, data analysis, reporting and visualization. [9]All analytical tools have different specifications and can measure how they affect operational efficiency.

Quality of Data

Another indicator we can use to check data analytics is data quality. In today's world, achieving excellent quality of the data has become a vital aspect of data management. A company's ability to build stronger strategic plans and produce business strategies for decision-making is aided by having high-quality data. Failure to provide the organization with high-quality data has resulted in a slew of issues, including erroneous judgments based on inaccurate data, high operating costs, and a lack of user satisfaction. Furthermore, today's growing amount of data with unclear quality levels adds to the difficulty of effectively analyzing and using important data for the company Superior data quality is described as data that is suitable for purpose and likely to achieve the data consumers' goals. The quality of the data depends on a number of factors.

Consistency in data

Persistent data reflects the same condition represented by the same data, and the similar values are utilized throughout the system as standard representations. If information such as currency, month, and year indicate the same value, they must be represented in the same way. However, even with precautionary measures, data inconsistency issues can still occur. [23]

Dataset accuracy

The main characteristics of data accuracy are precision and error-free data. Comparisons to real-world data can be done in order to justify the precision and accuracy of data. [24]. To make this description more obvious, the data correctness dimension has been divided into two categories: semantic accuracy and structural accuracy[8]. Data quality research requires more knowledge about data, making it difficult to assess the value of data in the real world. Without this knowledge, the accuracy of meaning cannot be measured. [23]

Data timeliness

The timeliness of the data indicates the age of the data (R. Van and D. Strong, 1996). Conversely, timeliness of data can also be defined as an attribute of data (M. Bovi, R. P. Srivastava, 2003). As a measure of data timeliness, the datedness attribute includes age and volatility. On the other hand, both studies firmly agreed that users should judge timeliness and datedness in the perspective of application purposes. Data timeliness is critical since the most recent data has a greater chance of being considered high-quality data. This is supported by other researchers who have discussed the relevance of data in terms of timeliness. [23]

Data Volume / Variety / Velocity

Big data has three specific features or dimensions: volume, variety, and velocity. Volume relates to the amount of data, variety to the types of data, and velocity to the rate at which data is processed. Big data management issues, according to the 3V model, arise from the increase of all three features, not just the volume, but the large amount of data to manage. Organizations can handle big data difficulties by understanding the 3Vs of big data management.

Data Availability

To implement data analysis, you need access to your data. "New customer and market insights that come from marketing information are the basis for building customer value and relationships," according to the definition of customer insights. As a result, beyond individual data points, database analysis produces insights. You must evaluate a number of interrelated elements to gain insights from your data, including: The impact of data gathering, the obstacles that each circumstance provides to the business and its analysis, the various types of analysis that may be used to solve those problems, and the variety of insight that can be generated from various methodologies.

- Personal data that has been obtained previously may not be legal to gather and will not be available for analysis.
- Data can be anonymized and personal data can be removed.
- Some information may only be provided in aggregated form.
- Data at the individual customer level may be accessed with the customer's consent via an opt-in process.

2.4 Data Analytics in apparel sector

Smooth operational functions are the foundation of manufacturing process. Making available raw materials on time, recruiting qualified professionals, identifying ways to improve manufacturing process, sufficient IT support, will be the base for operational excellency Overstocking and overproduction not only pose financial problems for companies, but also environmental problems that need to be addressed to ensure business sustainability. And also causes social problems. For this purpose, it is advisable to design a pull production system that ensures a level of integration within the textile apparel supply chain. With proper production and operational planning, you can reduce production costs and optimize the resources available in your manufacturing facility. To do this, we recommend that you carry out an appropriate intensive production planning process to minimize total labor and inventory costs in the medium term. IE and OM Implementation RMG industry capabilities are critical to business sustainability and need to be properly monitored for success Several studies conducted in Sri Lankan context on key factors influencing the implementation of data analysis in the context of Sri Lankan clothing. The inability to adapt to difficult digital environments has separated the vulnerable in the industry and made employers stronger. It's crucial to figure out what elements determine whether or not companies in the garment business will use big data analytics. They identified a framework called the (TOE) framework and the Technology Acceptance Model (TAM). They are used as a basic framework for investigating the impact on user attitudes towards use and ultimately influence the intent of adopting analytics with big data. [25]

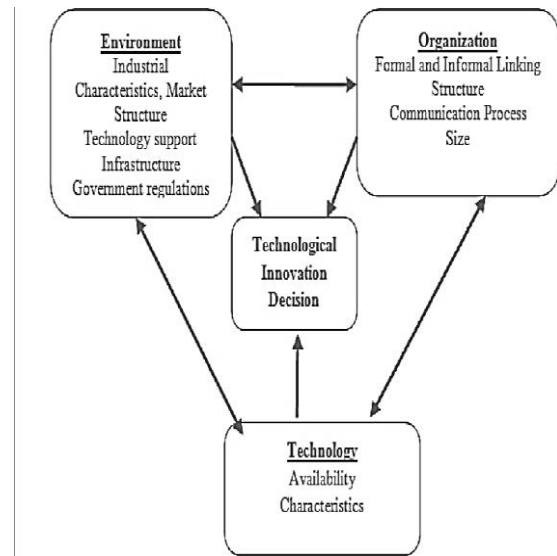


Figure 5 Technology Acceptance Model (TAM)

The Chinese manufacturing industry, the clothing manufacturing industry, has entered an era of data analysis, where the use of information technology has greatly improved productivity. The findings suggest that investments in information technology, such as software, hardware, and overall information technology, can increase performance. Investment in technology has the highest impact on organizational performance of all of them. A 1% increase in software investment share will increase a company's performance by 17.6%.

3. CHAPTER 03 -RESEARCH METHODOLOGY

According to the literature review we can determine that Business analytics directly impacts organizations operational efficiency. Each division can be improved in different way without time consuming because it helps organization to take strategic divisions. In order to Identify what are the how business analytics influencing operational excellence, this research is planned to conduct in quantitative method, and on deductive approach. Hypothesis is developed on literature researcher referred in the literature review.

Due to time and resource constraints, the number of study participants is limited to Sri Lanka, and 120 printed questionnaires are distributed to get more than 100 respondents to determine how data analysis affects the work of each department.

3.1 Conceptual framework of research.

Independent variable is data analytics. Dependent variable is operational efficiency. 3 independent variables will be used to measure impact of operational efficiency. Those are Data analytical tools, Quality of data and data availability.

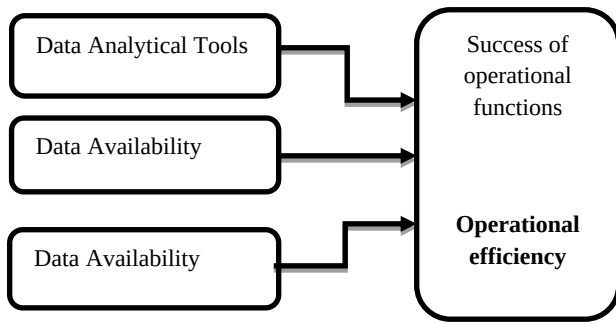


Figure 6. Conceptual framework 9 (Created by researcher)

3.2 Development of hypothesis

In here hypothesis is built to identify relationship of data analytics with operational efficiency of the ABC Company

Hypothesis 1: Relationship between Data Analytical tools and operational efficiency of apparel sector

H01– Data Analytical tools are directly impacting Operational efficiency of operational functions

Ha2- Data Analytical tools are not directly impacting to operational efficiency of the operational functions of garment sector

Hypothesis 2: Relationship between Quality of Data and operational efficiency of apparel sector

H₀₂– Quality of data directly impacting Operational efficiency

Ha2 – Quality of data not directly impacting Operational efficiency

Hypothesis 3: Relationship between Data Availability and operational efficiency of apparel sector

H03 – Data Availability is directly impacting Operational efficiency

Ha3 – Data Availability is not directly impacting Operational efficiency

3.3 Operationalization

Several indicators were identified in the literature review to determine the relationship between data analysis and operational effectiveness. Three independent variables were selected to measure the analysis of the data studied, and a minimum of three measures were used to rate each unit. A total of 17 measurement points were selected for the questionnaire. All measures were scored on a 5-point Likert - type scale, with 1 indicating strong disagreement and 5 indicating strong agreement. The average result measurement items were used to obtain the final result for each element.

3.4 Research Design

This study took a quantitative approach as it aimed to determine the impact of data analysis on the operational efficiency of the apparel sector. We chose this approach because the qualitative approach takes longer and can only consider smaller sample sizes. Printed questionnaires are distributed to five selected departments to collect employee data.

3.5 Data Collection Methods

Primary and secondary data collecting methods are the two most common types of data collection. The primary data

technique for research analysis is a researcher's approach to data collection methods. Direct information is the most common data collecting method, and it is collected in its raw form. A survey approach is used to acquire primary data. Each department's focus groups are chosen using the snow howl approach. Paper surveys had much greater response rates than online surveys, according to G. Yetter and K. Capaccioli[27] and survey duration has a detrimental impact on response rates. As a result, a paper survey approach was used in this study, and the questionnaire was made as short as possible to encourage clients to respond. There were a total of 20 questions in the survey. To develop an employee's demographic profile, six questions were asked in Part A. Part B has 17 questions and a five-likert scale to rate four variables. 1-strongly disagree, 2-strongly disagree, 3-moderate, 4-agree, 5-strongly agree were the scales. 120 questionnaires were issued to factories located in Balapokuna, Kettarama, Palapatwela, Narammala and Mawatagama. 116 questions were collected. 13 of the 116 questionnaires were incomplete. Therefore, 103 filled samples were taken for analysis.

3.6 Research Analysis Techniques

MS Excel and SPSS tools were used to examine the data. Because of independent and dependent variables were tested using three measurement items, each factor was subjected to a reliability analysis to establish its level of dependability. Cronbach's alpha value was validated during reliability analysis. In data analysis, Pearson correlations, coefficient levels, and mean standard deviations were used.

4. CHAPTER FOUR -DATA PRESENTATION AND ANALYSIS

4.1.1 Cronbach's Alpha survey questionnaire

Reliability test

Cronbach's model test is used to determine the survey's multi-item Likert scale's reliability. For Likert scale questions, the alpha ranges from 0 to 1. The test's basic rule is that alpha 0.700.79 is okay, 0.800.89 is good, and anything above 0.90 is acceptable. Internal consistency of 0.600.69 was considered acceptable, 0.505.59 was poor, and less than 0.50 was unacceptable. In this study, the researcher measures the reliability accuracy of the variables of interest to understand the impact of data analysis on operational functions in the apparel industry, ABC company in Sri Lanka.

$$\alpha = \frac{K}{(K-1)} \left(1 - \frac{\text{sum of variances}}{\text{Sum of variances and covariances}} \right)$$

K = Number of test Items

Figure 7 Cronbach's alpha of the study

Scale: data reliability -all variables

Case Processing Summary			
		N	%
Cases	Valid	103	100.0
	Excluded ^a	0	.0
	Total	103	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics	
Cronbach's Alpha	N of Items
.705	17

Figure 8 Cronbach's alpha calculation in SPSS software (create by author)

As per the equation above, the Cronbach's alpha value is 0.705, indicating that the core constant is acceptable and that the five-point Likert scale exceeds the reliability in this investigation. Cronbach's alpha is a measure of internal consistency.

4.1.2 Pearson correlation analysis

Correlation between Data analytical tools and Operational Efficiency

The study's conceptual foundation was tested using correlation analysis. Pearson's correlation was used to determine the direction and strength of link between two variables in correlation analysis. To determine correlations between survey variables, Pearson's correlation analysis is employed. A value between -1 and 1 is generated by the formula. where 1 denotes a completely strong and positive relationship, -1 denotes a completely strong and negative relationship, and 0 denotes no relationship at all. Data analysis tool, data quality, and data availability were employed as independent variables in this study, with operational efficiency as a dependent variable. It depicts the interrelationships between the variables. The dependent variable and all independent factors are positively connected. At a significance level of 0.01, all independent factors exhibited a positive connection with dependent variable of client satisfaction. Availability of data and operational efficiency, in particular, have a strong beneficial link. At the 0.01 significance level, the direction and magnitude of the correlations indicate preliminary support for the study's conceptual framework.

Table 1 Person Correlation(created by author)

Dependent Variable	Pearson Correlation
Data analytical tools	0.469
Data quality	0.329
Data Availability	0.686

Correlation analysis, may exaggerate the strength of correlations between variables. This is followed by a regression analysis to put the conceptual framework to the test.

4.2 Simple Regression Analysis

Simple regression analysis was used to confirm the dependent variable's link with one independent variable and to assess the independent variable's effect on the dependent variable. Furthermore, the coefficient of determination (R² value) indicates how well the independent variable can explain the dependent variable.

4.3 Correlation between data analysis tools and operational efficiency

The Pearson coefficient of the association between the data analysis tool and operational efficiency is 0.469, as shown in the table, and the two variables are theoretically positively correlated, however the relationship is weak, meaning the values are close. It demonstrates this. The weaker the link, the more equal to zero it is.

Another key indication to consider is the P-value, which shows the degree of importance between the relationships of the two measurement variables. To demonstrate that the relationship between variables is significant, the level of significance must be less than 0.05.

Correlations

Descriptive Statistics			
	Mean	Std. Deviation	N
DAT	4.1800	.63869	100
OE	2.8733	.63348	100

Correlations			
		DAT	OE
DAT	Pearson Correlation	1	.469**
	Sig. (2-tailed)		.000
	N	100	100
OE	Pearson Correlation	.469**	1
	Sig. (2-tailed)	.000	
	N	100	100

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 9 Correlation between data analysis tools and operational efficiency

From figure 10 above, we can see that this relationship is important because the importance of the correlation between data analysis tools and operational efficiency has a value of 0.01.

4.4 Correlation between quality of data to operational efficiency

Figure 11 reveals that the Pearson coefficient is 0.329, indicating a weak positive association between data quality and the dependent variable's operational efficiency. Furthermore, the significance of the relationship among wasted time and academic achievement was 0.01, indicating that the two variables have a significant relationship. The scatter plot in Graph 27 above illustrates that quality of the data and operating excellence have a weak positive linear connection.

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
OE	2.8733	.63348	100
QAD	4.2329	.40795	100

Correlations

		OE	QAD
OE	Pearson Correlation	1	.329**
	Sig. (2-tailed)		.001
	N	100	100
QAD	Pearson Correlation	.329**	1
	Sig. (2-tailed)	.001	
	N	100	100

** Correlation is significant at the 0.01 level (2-tailed).

Figure 10 Correlation between quality of data and operational efficiency

4.5 Correlation between Data Availability to operational efficiency

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
OE	2.8733	.63348	100
DAV	3.8900	.74469	100

Correlations

		OE	DAV
OE	Pearson Correlation	1	.686**
	Sig. (2-tailed)		.000
	N	100	100
DAV	Pearson Correlation	.686**	1
	Sig. (2-tailed)	.000	
	N	100	100

** Correlation is significant at the 0.01 level (2-tailed).

Figure 11 Correlation between Data Availability to operational efficiency

Figure 12 above shows that the Pearson coefficient took a value of 0.686 to show a strong positive correlation between data availability and dependent variable operational efficiency. In addition, the significance of the correlation between data availability and operational efficiency is 0.01, which also represents a significant relationship between the two variables. The scatter plot in Graph 20 above shows a

strong positive linear relationship between data availability and operational efficiency. This relationship is the highest of all other dependent variables.

As a result, there is a positive correlation between the dependent variable and all independent variables in the correlation analysis. Furthermore, significant results reveal a strong link between all independent variable and operational efficiency. Data availability, on the other hand, has a far greater link than operational efficiency.

4.6 Analysis of Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.713 ^a	.508	.492	.45135

a. Predictors: (Constant), DAV, QAD, DAT

Figure 12. Model Summary

Regression Analysis is one of the most important tests used in this study. The goal of regression analysis is to see how descriptive factors affect ABC Clothing pvt ltd's operational efficiency. In this study, the author performed regression analysis to see how all of the independent factors effect operational efficiency. These factors were chosen based on the results of several studies that looked into the impact of big data analysis on operational efficiency. of ABC Clothing Pvt Ltd. Regression analysis can also be used to determine how much the study's independent variable variability causes the dependent variable variability. The regression analysis was divided into various parts and analyzed in this study as shown below.

It is used to determine the variance induced by the independent variable of the dependent variable and to forecast the correlation between the variables in the study. As indicated in the figure above, the values of the dependent variables retrieved indicate that they are not distributed around the regression line. As a result, the R value of 0.736 indicates that the suggested regression model captures a large amount of the overall variance of the dependent variable. It can alternatively be expressed as a variance of 73.6 percent of the dependent variable caused by explanatory variables. Calculate this variability factor by summing the squares of the variance between the respondent's dependent variable's projected value and the mean divided by the total number of survey respondents. The percentage of total variance described by the regression model is calculated by dividing the described variance by the total variance of the dependent variable. The coefficient of determination is a rate that varies from 0 to 1. As you can see from the table above, the adjusted R-squared value is 0.492, which is 49.2% of the total variance of the academic performance variables predicted using data quality, data availability, and data analysis tools. The remaining deviations may be due to other undetected factors.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.172	3	6.724	33.008	.000 ^b
	Residual	19.557	96	.204		
	Total	39.729	99			

a. Dependent Variable: OE

b. Predictors: (Constant), DAV, QAD, DAT

Figure 13 (ANOVA)

Analysis of Variance (ANOVA) is a statistical method for determining the adequacy of a research model. In the ANOVA table, the F-number and the significant difference value are two crucial metrics. The model fits better with a larger F value, however the significant difference value is utilized to establish the model's relevance in the study. The F-number for this study was 33.008, which is quite high and indicates that the model is well-fitting. The significant difference, on the other hand, is 0.000, which is less than 0.05. This indicates that the model utilized in this research is important.

4.7 Coefficients

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.276	.500		-.552	.582
	DAT	.189	.081	.190	2.340	.021
	QAD	.107	.121	.069	.886	.378
	DAV	.491	.070	.577	6.966	.000

a. Dependent Variable: OE

Figure 14 Coefficients

According to the above table we can see All independent variables have positive coefficients .it indicating that Every independent variable has a significant influence on the dependent variable. According to the sample remarks, the majority of people believe that data availability has the greatest impact among the other independent variables.

4.8 Mean and Standard Deviation of Measurement Items

The mean of the data analysis tools is 4.17, which is close to five, which shows that the data analysis tools we are using are performing quite well. The standard deviation is 0.96, which means that the values in the data are somewhat close to the mean and are reliable. When he looked at the individual values of the metrics, he found that there was still room for improvement in data access and collection.

The mean data quality value is 4.2233, which implies that employees tend to agree. The quality we currently have for data analysis and interpretation is good. But the standard deviation is close. This means that perceptions of data quality vary among respondents, with some saying the data quality is good, but others calling it poor.

final independent variables Data availability, mean 3.89 implies that employees agree that they are neutrally satisfied

with the availability of data. But the standard deviation is 1.134, which is a bit high, to gauge data availability.

Table 2 Mean/Standard Deviation

Measurement	Item	Sample	Mean	Std. Deviation
1)Data analytical tools			4.17	0.96
Data Access and collection	DAT 1	103	3.80	1.07
Data Storage	DAT 2	103	4.17	1.08
Data Analysis	DAT 3	103	4.22	0.93
Reporting and visualization	DAT 4	103	4.50	0.77
2)Quality of Data			4.22	0.95
Accuracy of data	Q1	103	4.43	0.71
Completeness of data	Q2	103	3.90	1.17
Timeliness of data	Q3	103	4.23	1.07
	Q4	103	4.11	0.87
Data Volume	Q5	103	4.01	1.21
Data Variety	Q6	103	4.42	0.83
Data velocity	Q7	103	4.47	0.76
3)Data availability			3.90	1.13
Service outage time	DA1	103	3.93	1.08
Upgrade time	DA2	103	3.68	1.18
Failover/Switchover time	DA3	103	4.08	1.14
4)Operational Efficiency			2.88	1.00

4.9 Hypothesis Testing

Table 3 Hypothesis Testing

hypothesis	result
H01- Data Analytical tools are directly impacting Operational efficiency of operational functions	Accepted
Ha1-Data Analytical tools are not directly impacting to operational efficiency of the operational functions of garment sector	Rejected
H02-Quality of data directly impacting Operational efficiency	Accepted
Ha2-Quality of data not directly impacting Operational efficiency	Rejected
H03- Data Availability is directly impacting Operational efficiency	Accepted
Ha3- Data Availability is not directly impacting Operational efficiency	Rejected

According to above analysis all null hypothesis are accepted and Alternative hypothesis are rejected.

5. CHAPTER FIVE CONCLUSIONS AND RECOMMENDATION

5.1 Summary of the Study

ABC clothing pvt limited is a well-known multinational clothing manufacturer in Sri Lanka, when all the other major clothing manufacturers were facing a downturn in business, ABC Clothing found a new expansion strategy to survive in the market. Their manufacturing plants in Kenya and Ethiopia are operating in dual shifts to manage the resumption of orders. They have built a dynamic and resilient culture, better suited to weathering times of crisis.

Through this ABC's restructuring and transformation, By the end of the 2020/21 fiscal year, they had managed to keep sales and earnings at pre-pandemic levels. So now they are looking to data analytics and digital transformation to make these scaling and transformation operations efficient as it will help with integrated analysis of all data and make decisions. more important decisions for top management.

Currently they are using information management systems, but due to various reasons such as less access to real time data, there is no hub to connect and integrate data gathered through various sources, do not provide Visual representation etc.), information provided to higher management does not provide significant importance ,or new areas to focus .So during this study researcher tried to identify how data analytics will impact on operational efficiency in garment sector and what are the different variables we should look in when adopting data analytics to garment sector (Identify what are the specification organization should focus when buying analytical tools ,Identify the quality of data which organization already have ,Identify availability of data in the organization).

From the literature review, data analysis tools, data quality and data availability were identified as factors affecting the performance of the apparel sector. On this basis, a conceptual framework and the following research hypotheses have been developed.

Table 3 Hypothesis analysis(created by author)

hypothesis
H01- Data Analytical tools are directly impacting Operational efficiency of operational functions
Ha1-Data Analytical tools are not directly impacting to operational efficiency of the operational functions of garment sector
H02-Quality of data directly impacting Operational efficiency
Ha2-Quality of data not directly impacting Operational efficiency
H03- Data Availability is directly impacting Operational efficiency
Ha3- Data Availability is not directly impacting Operational efficiency

At least three measurement points were taken to evaluate each variable. A total of 17 measurement points were defined to

evaluate all four study variables. All measurement points were evaluated using a 5-point Likert scale Because the qualitative approach is time consuming, qualitative research can look for smaller sample sizes. Therefore, this study adopted a quantitative research approach to generalize the results of the company's Sri Lankan context. The data was analyzed using Microsoft Excel and SPSS software. In a reliability investigation, the Cronbach's alpha value was evaluated. The correlation between the variables was determined using correlation analysis. To determine the effect of the independent variable on the dependent variable, simple and multiple regression analyses were used. Females made up 51.45% of the total number of responders. The majority of the employees are between the ages of 25 and 35. In the context of Sri Lanka, this suggests that ABC Holdings has fairly young generation power. The majority of the personnel that took part are from the finance, supply chain, and logistics sectors, with 31% of them being graduates. A college or graduate degree is held by 72.8 percent of the population. In a nutshell, ABC Clothing boasts a well-informed team.

Age, education, and years of service were all different. This demonstrates how diverse and knowledgeable the sample population is. At a significance level of 0.01 (p<0.01), correlation analysis revealed that all independent variables were positively associated with the dependent variable, customer satisfaction. Customer satisfaction is positively correlated with data analysis tools and data availability in particular. According to regression analysis, all independent factors are positively associated to the dependent variable's customer satisfaction. As a result, all null hypotheses were rejected in this investigation, whereas all alternative hypotheses were accepted. In addition, the 49.2% deviation in operational efficiency can be explained by data analysis tools, data quality, and data availability. After analyzing the

mean and standard deviation, researchers found that the availability of data was the lowest mean of 3.89 among other independent variables. So there is room for growth. For the other two independent variables, the mean is higher than 4. This means that employees are quite happy with the current status and data quality of their data analysis tools. The average operational efficiency is 2.88, which is so low that the majority of the sample population believes that the operational functions of the organization are not operating at the most efficient level.

5.2 Recommendations and Conclusion of the Study

5.2.1 data analytics effect on operational efficiency

The primary objectives of this study were to identify how data analytics effect on operational efficiency in apparel sector. Furthermore, this study aimed to make what are the specification organization should focus when buying analytical tools, Identify the quality of data which organization already have, Identify availability of data in the organization.

The results demonstrate that All independent variables (Data analytical tools, Data quality and data) have positive correlation with dependent variable. Data availability have the highest correlation among the dependent variables. According to the adjusted R square value Dependent variables effect on operational efficiency is 49.2%.

5.2.2 Specifications organization should focus when buying analytical tools

Specifications related to data analytical tools were measured under for parameters Data Access and collection, Data Storage, Data Analysis and Reporting and visualization. In first measure what researcher checked was whether employees currently have real time Data Access and collection from different factories located in Sri Lanka. only 66.02 % of sample population satisfied about real time data organization have, so 33.98% is not satisfied with the level. Around 77% of population satisfied about data storage level of each division. 83.50% of sample population satisfied with the current level and options for data analysis and organization can be satisfied about it. 83.49% of population thinks Information representation via data visualization techniques will help higher management to get quick understanding about trends and specific information. So when adopting to new data analytical systems organization should focus about variables which have room to grow, Real time data access, Visual representation options for information and data storage.

5.2.3 quality of data which organization already have

In this research quality of data which organization already have measured via 7 parameters. Those are Accuracy of data, Completeness of data, Timeliness of data, Data Volume, Data Variety and Data velocity. Mean value of most parameters are above 4 but most of the population commented negatively about completeness of data. So organization have to improve steps to ensure completeness via improving input methods of data. Data input roles should be monitors and feed backs should take from executive above level to check whether what are the imperfection data we have. 89.32% of sample population satisfied about accuracy of current data. it's a satisfactory level but organization should take more steps ensure 100% accuracy. Around 83.5% of sample population satisfied about timeliness of data. 82% thinks budgeting, reporting and costing related functions directly impacted through timeliness. Only 71.84% of population commented they have maintained past five years' data. but other 28.16% commented they do not maintain past five years' data. it's a warning a concerning factor, maintaining real time records historical data is so important. around 89% of population commented they have to deal with structured and unstructured data to generate information for reports and other purposes. Only 66.4% of population satisfied about velocity of data. organization have to pay attention about these factors and alter parameters to improve quality of data.

5.2.4 Availability of data in the organization

this variable was measured via 3 parameters Service outage time, Upgrade time, Failover/Switchover time. 71.84% of population commented frequently faced major Service outage times during working time. 61.17% of sample population commented they spend long idle time during work time due to current data analytical tools upgrading. 72.82% commented they have faced major switchover or fail over time during implementation stage of current analytical tools. these all factors are alarming. working time is the most important asset for every employee. These unintended idle times adversely impacting to organizations success and without doing a proper research organization would not even recognize these alarming factors. Organization should focus on improving availability of data via enough amount of planning during these important phases (implementation, updating /servicing time for current data analytical items). human resource should be managed and allocated properly to avoid idle time as much

as they can.

5.3 Suggestion for Further Research

Researcher had to narrow down the scope due to limited timeframe and resources. Since ABC clothing pvt limited is a multinational company Researcher encourage others to do this in other foreign branches across the world because it will give a whole new insight about adopting data analytics.

As discussed in research methodology researched tried to narrow down and focus only about operational functions in the garment sector. This research can evaluate how operational efficiency will be impacted by data analytics for all the possible divisions of garment factory.

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7. APPENDIX

Scatter diagrams created by author to identify relationship between variables

