

Impacts of Data Warehouse and Customer Experience Management (CEM)

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Abstract- The purpose of this paper is to examine the role of the data warehouse in the development of customer experience strategies to improve marketing efforts. The internet, mobile devices, and social media have changed the landscape of not only how customers interact with a business but also how they interact with other potential or current customers of the business.

Index Terms- Data Warehouse, Customer Experience Management (CEM), Data Quality, Business Intelligence (BI)

I. INTRODUCTION

The internet, mobile devices, and social media have changed the landscape of not only how customers interact with a business but also how they interact with other potential or current customers of the business.

Foley [13] indicates that data warehouses play a pivotal role in customer experience initiatives because they house the data used to establish a comprehensive, 360-degree view of your customer base. A data warehouse of customer information can be used for sentiment analysis, personalization, marketing automation, sales, and customer service. The key to a successful implementation of a data warehouse for the purpose of deploying effective customer experience strategies are defined by Taylor's [26] article as the ability to analyze data from multiple sources, direct access to data by analysts, and the ability to gain insights from high velocity data. Historically a data warehouse is set up with a required format for all of the data being stored in it so it can be easily managed and analyzed by the administrator. This requires technical resources to transform the data into the useable format which slows down the analysis process and waters down the data in some respect. However, data quality cannot be compromised when establishing a data warehouse since the results of all the analysis, decision making, and follow on actions are only as good as the data they are based on.

The ability of a business to understand the type of experience the customer is having while interacting with it has become a critical piece of the puzzle on how to market products and services to the individual customer in order to give them the most satisfying experience possible.

II. LITERATURE REVIEW: CUSTOMER EXPERIENCE

A review of the literature reveals Customer Experience is a growing area of focus for many companies due to the nature of today's society where mobile applications and social networks are quickly becoming the primary way of interacting with businesses for people. According to Gartner analysts McLellan

and Sorofman [22] growing competition and consumer power have eroded traditional product based advantages, forcing organizations to shift to a new battlefield: the customer experience. Marketing leaders are expected to create exceptional branded moments at every touch point. The results of a 2014 Gartner survey show; 89% of companies' surveyed plan to compete primarily on the basis of the customer experience by 2016. Fewer than half of companies surveyed rate their customer experience as exceptional today, but two-thirds expect it to be so in two years. 65% of companies surveyed have the equivalent of a chief customer officer — they report equally to CMO and CEO. Customer executives are expected to lead a closed-loop system of insight and action, where customer data drives multichannel customer experiences. Marketing controls the majority of the customer experience budget in more than half of the surveyed companies. Although people are rated the top priority for improving the customer experience, the top investments and growth are in technology.

The importance of customer experience to businesses today is clearly pointed out in the latest thinkJar survey results. Afshar [2] identifies the highlights from this survey as; 55% of consumers are willing to pay more for a guaranteed good experience. 86% of consumers are willing to pay more for an upgraded experience. Customer frustration leads to the following: 13% to tell 15 or more people if they're unhappy. Conversely, 72% of consumers will share a positive experience with 6 or more people. It is 6-7x more expensive for companies to attract new customers than to keep existing customers. 66% of customers who switched brands did so because of poor service. There is a clear disconnect between customers and companies in regard to this subject. According to Best [5] only 8 percent of customers describe their experience as superior but 80 percent of companies believe they offer a superior experience to customers. An Effective execution of customer experience strategies will yield cost savings and revenue growth based on research highlighted in Business Wire, [7] it shows positive effects in both categories. One percent improvement in first-call response equaled \$276,000 in annual operational savings for the average call center. When companies engage and respond to customer service requests over social media, those customers end up spending 20 to 40 percent more money with the company.

Even though the data warehouse is not considered a cutting edge or an all-encompassing solution to the big data problems caused by the multiple sources of data it is still a very important piece of the solution. A Dimensional Research [11] survey published in March 2015 found that: 99% say their data warehouse is important to their business operations, 70% are increasing their investment in data warehousing, Scalability and

cost are top challenges, 91% have considered a Big Data investment, only 11% have a pilot in place, and only 5% have fully deployed their Big Data initiative. 96% say Hadoop will not replace their existing data warehouse. 93% see value in the potential benefits of cloud data warehousing. The scalability and reduced overhead being the most valuable part of cloud data warehousing. 32% have a cloud-based data warehouse today; 16% use only a cloud-based data warehouse.

The issue of data quality as presented by Friedman and Smith [14] shows that 40% of all business initiatives fail to meet target benefits due to poor data quality. The productivity of the labor force is affected up to 20% by data quality. The more automation is used for business processed the more process quality is tied to data quality.

2.1. Customer Experience

Afshar [2] quotes thinkJar CEO, Esteban Kolsky's, definition of customer experience as the sum total of conscious events, as a coordinated series of interactions between a customer and a brand to accomplish anything. Above all words, a customer experience is defined by the customer, for the customer, at each touch-point, each time.

Swinscoe [25] provides insight about why customer experience is so important to acquiring and maintaining customers. Human nature makes us fundamentally more averse to loss and bad experiences which mean companies that can deliver services in ways that minimize bad experiences will be more successful at retaining customers than businesses focusing on creating an overwhelming positive experience. In the end the ability to recognize mistakes and fix them in a timely manner will keep customers happy with the company.

A company's ability to provide a satisfying customer experience goes beyond having the right technology solutions in place. Crandell [8] explains that customer experience is really about what the customer values which varies by customer and changes during the lifecycle of the relationship between the customer and the company. Employees need to understand their role in the customer relationship, believe in it, and have the information required to meet the value expectations of the customer. Technology is an important tool in this process which is used by employees to provide value.

Zwilling [30] points out 6 key differentiators outlined by F. Scott Addis related to customer experience which are as follows; listen to the individual customer, exploit your product and service differences, demonstrate the value of your offering, show your passion and creativity in every solution, demonstrate your personal commitment, and shoot for the customer's hearts.

2.2. Customer Experience Management (CEM)

Gartner.com [15] defines customer experience management (CEM) as the practice of designing and reacting to customer interactions to meet or exceed customer expectations and, thus, increase customer satisfaction, loyalty and advocacy. It is a strategy that requires process change and many technologies to accomplish.

Basset [4] points out that as a company moves toward CEM, it's a good idea to set specific goals and define how success will be measured. The frontend and backend processes need to align to support CEM initiatives. The IT department must be involved

from the start of the project due to the key role they play in the implementation. An effective CEM delivers satisfying experiences to the customer so that they feel valued and understood with the results being a high rate of retention and positive view of the business to others. It will increase the Customer Lifetime Value for the business, increase revenue and margins from that customer.

Abramow [1] sites the importance of empowering customers and employees in order to provide the best possible customer experience. There are 6 best practices that will help facilitate the empowerment for customers and employees that will increase adoption, sales, and loyalty. The best practices are outlined as follows:

- Provide multiple channels for customer communications to cater to all demographics to receive as much customer feedback and knowledge about the company's performance as possible.
- The customer and the employees should have multiple channels to communicate during the customer life cycle. Employees should have the ability to access all of the historical customer interactions with the customer in order to provide seamless service.
- The company must establish customer service policies which are geared toward effective problem resolution and customer satisfaction.
- Provide the customer with the ability to track the progress of problem resolution activities or supplying proactive resolutions to general issues.
- Allow customers and employees to identify or flag inaccurate data in the system so it can be corrected in a timely manner which will reduce the level of churn in organizations by eliminating repeat activities.
- Every customer interaction with the company is an opportunity to collect information about their experience which can be used to improve it.

2.3. Data Warehouse

Wikipedia.org [28] defines a data warehouse a system used for reporting and data analysis. Data warehouses are central repositories of integrated data from one or more disparate sources. They store current and historical data and are used for creating analytical reports for knowledge workers throughout the enterprise. Examples of reports could range from annual and quarterly comparisons and trends to detailed daily sales analyses. Techadvisory.org [27] outlined 5 signs to look for that may signal the need for a business to consider implementing a data warehouse. A heavy reliance on spreadsheets to store and generate reports on data collected by business systems is the first sign. The second is the spreadsheets are overwhelmed with data to the point they no longer operate efficiently. The third indicator is trying to generate reports in a timely manner from multiple spreadsheets is not possible or efficient. The fourth is inconsistency, lack of correlation, or outright mistakes in the data generated by multiple manual sources. Lastly more time is required to keep the data accurate and generate the reports than is spent on the analysis of the results.

Burnside's [6] article points out the data warehouse is not a simple undertaking with low risk and no adverse effects on the business. It typically involves gathering data from new sources

like customers or groups within the business that were not reporting before. The projects can be heavily dependent on the IT group in the business. The return on investment for the expense of implementation and maintenance of the data warehouse may not be acceptable if the tool is not an integral part of the operation of the business which will drive cost savings, efficiency, and revenue growth. The security of the data is paramount since it not only contains critical business information but in some case customers personal information. If the tool is not chosen wisely it can result in the system that is inflexible with 'watered down' results which may not be current.

2.4. Data Quality

Dijcks [9] defines a data quality as the level at which data is perceived to be true and accurate. However, the term quality in this case is very subjective and each individual involved may have different standards for high and low quality. High quality to one person could be average or even low quality to another which makes quality level hard to measure. In order to define the scope of data quality properly it should include all data that involved in the delivery of information to end users. The data warehouse is one area most heavily impacted by data quality problems. The data quality of "hard data" is normally caused at source or operational system. While quality issues with soft data are typically caused by the fact this type of data was never stored prior to the creation of the data warehouse and never used for any type of analytics. In order for the data quality in a system to be kept at a consistently acceptable level requires ongoing maintenance as new data sources and processes can cause degradation in quality.

The importance of data quality is pointed out by Dubois [10] as it is a widely held belief the amount of data collected by organizations will expand by one hundred over the next five years. This trend will require larger companies to increase their reliance on Enterprise Wide Data Quality processes in order to have real time the ability to handle and manage the data accurately in a cost effective and efficient manner. Enterprise Wide Data Quality creates value by giving business units the ability to use information from multiple sources in the most efficient way and it provides each customer touchpoint a unified, accurate customer view. By implementing an effective data quality process across the enterprise it will result in:

- Provide customer service that reflects the customer's needs and interactions with the company.
- Identify opportunities to sell multiple products to the same customers.
- Reduced overhead costs based on higher employee productivity.
- Improve the efficiency and outputs of local systems.
- Allow for improved and effective decision making related to through more accurate analytics.
- Increase revenues through knowledge that could not otherwise be realized

2.5. Business Intelligence

Wikipedia.org [29] defines business intelligence as a set of techniques and tools for the transformation of raw data into meaningful and useful information for business analysis

purposes. The data warehouse or data mart is typically a key component of most business intelligence systems as they house the data needed by the tools to complete the analysis. A business intelligence system is normally used for creating metrics, analysis to create knowledge for decision making, report generation, and management of knowledge.

However, the implementation of business intelligence is not widespread according to a Sungard survey as reported by Groenfeldt [16]. The majority of the responses to the survey showed the majority of companies were performing reactive analysis to the data using spreadsheets, manual data manipulation, and only periodic reporting of results. Approximately 20% of the respondents were engaged in a proactive approach to use the data and only 13% were using business intelligence tools for predictive analysis or alerts. One of the key inhibitors for companies to make the change to advanced all-encompassing business intelligence is the fear of losing expertise in specific areas and the loss of tool performance after moving from high end specific tools to a single large system.

III. EXAMPLES OF COMPANIES USING THE DATA WAREHOUSE AS PART OF THEIR CUSTOMER EXPERIENCE SOLUTION

Recreational Equipment, Incorporated (REI) is a retailer of outdoor equipment, sporting goods, classes, and clothing. A review of REI.com shows the company has 143 retail stores in 35 states. They also sell product through the use of catalogs and the internet. Laudon and Laudon [19] point out that REI is a consumer cooperative company which is a business owned by its customers for their mutual benefit. In order to better understand their co-op members and customer base REI created a data warehouse containing information from many sources. The customer's information about preferences will come from in store purchases, catalog purchases, web site browsing, or attendance to clinics. Based on a customer's interactions their specific likes are stored in the data warehouse. REI will use that information to send customer information about places to go for that interest, clinics at their stores, and products related to the interest.

IBM.com [18] reported that IBM worked with REI to build a sophisticated data warehouse, which was based on IBM's DB2 9 "Viper" technology. Julie Derry who oversees customer relationship management for REI believes DB2 9 technology allows REI to be provided a better customer experience to its members in a more effective and efficient manner. Marketwired.com [21] states DB2 9 has several key features and enhancements such as the ability to manage conventional and pure XML data without reformatting, row compression, automated storage management, label based access control, 3 simultaneous methods of data partitioning (range partitioning, multi-dimensional clustering and hashing), and automated memory management. These features and improvements provide flexibility and reduced the labor needed to manage the data.

Olavsrud [23] reported how the new Amazon Redshift data warehouse solution is giving several businesses a competitive advantage in regard to understanding, improving, and capitalizing on customer experience without the large investment in infrastructure. The Financial Times uses Redshift to run

450,000 online queries 98 percent faster than before, while reducing infrastructure costs by 80 percent. In 2012 Nokia's database broke down due to the sheer volume of data. Nokia now runs queries twice as fast with Redshift and use its business intelligence tools to mine and analyze its data at a 50 percent costs savings. HauteLook is saving on costs due to having no hardware costs, maintenance, or overhead costs related to the data warehouse. The annual costs for Redshift are equivalent to the annual maintenance of some cheaper on-premises options for data warehouses.

Walmart uses the data warehouse concept to drive its business based on customer data primarily related to product purchases. According to Sanders [24] Wal-Mart's data warehouse was the first commercial one to reach 1 terabyte of data in 1992. The case study by Laudon and Laudon [20] and CNBC video show that Walmart's supply chain starts at the cash register which logs all of the transactions and sends them to a central data base. The system triggers logistics to ship replacement goods that are selling in stores based on this data. The analysis of the customer data is pinpointed by store location which allows Walmart to purchase materials in bulk based on the needs of all the stores combined which gives them tremendous purchasing power with suppliers due to high volume orders. It insures only products which selling are being purchased and not unnecessary inventory items. The analysis and results tell Walmart exactly which stores need which product types during peak sale opportunities. Walmart's sales have grown continuously from 2011 through 2014 despite the economic slowdown in 2011 and 2012.

Alanazi [3] reported that Federal Express utilizes business intelligence systems including a data warehouse to connect with all of its worldwide business partners. The system generates a variety of reports to analyze financial, operational, tactical, and administrative areas of the business. The system provides information quickly to employees so decisions can be made based on data. The data is collected from customers and internal users from 40 data marts and over 50 applications. The use of the system has reduced costs, increased productivity and efficiency, and created a competitive advantage in regards to customer service. The data analysis provided by the system allows Federal Express to make sound strategic decisions about how to move the business forward. According to Duvall [12] Federal Express achieved \$2.3 in savings and a 470% return on investment by giving its global business partners access to its data and analysis tools via secure internet portals. The implementation of the system globally free employees from having to crunch numbers manually and provides real time feedback to employees and customers on the status of their packages.

Higginbotham [17] explains how Federal Express a company which relies on continuous flow data from multiple sources to make decisions used sensor technology to add more granularity to how they track high value and critical shipments. The sensors are designed to monitor temperature, location, and exposure to light. Each sensor has a radio which transmits data continuously back to Federal Express which is analyzed and acted upon accordingly. The use of technology is providing added value to customers. Federal Express CIO, Robert Carter, is quoted "When we apply more bits to the atoms, we create more

opportunity for interactions, more opportunities to do business, and opportunities to change how you see the world."

IV. CONCLUSION

The research shows customer experience is an area that cannot be ignored by companies. For many businesses in today's market place the difference between acquiring new and retaining existing customers is closely tied to how their customers feel about the products, services, and interactions they have with the business. The ability of a business to deliver superior a customer experience than their competition gives them a critical differentiator that will attract and retain customers.

The research on the subject of using the data warehouse in the development of customer experience strategies to improve marketing efforts shows it is more often than not a key piece of the solution. The data warehouse is the engine behind any business intelligence system used to analyze the data, generate reports from the data, make strategic decisions, and execute the necessary actions. However like any other business system implementation it cannot be taken lightly and must be planned and executed with all of the proper stakeholders involved from the beginning. The justification and return on investment of the project must be clearly understood prior to the implementation. The good news is when properly implemented and maintained a data warehouse will provide a wealth of information that can be used not only to improve customer experience and marketing strategies, but it can lower operational costs and improve efficiency.

As the introduction session indicated the ability of a business to understand the type of experience the customer is having while interacting with it has become a critical piece of the puzzle on how to market products and services to the individual customer in order to give them the most satisfying experience possible. The key to executing this type of differentiation strategy is the ability to analyze and make decisions from the large volumes of data generated by customers when they interact with a business on site, via the website or mobile application, on social media, or over the phone. Successful businesses need to have the infrastructure to collect all of this data in its various forms, store it in one location, and have the ability to run analytics on it to make decisions about how to improve customer experience.

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