# Strategic Data Driven Approach to Improve Conversion Rates and Sales Performance of E-Commerce Websites

Hussain Saleem[1]*, M. Khawaja Shaiq Uddin[1], Syed Habib-ur-Rehman[1], Samina Saleem[2], Ali Muhammad Aslam[3]

**Abstract**— E-commerce is a buzzword to actually describe the electronic commerce trade activities happening between business and customers including but not limited to online shopping, digital payments, and online trading between businesses. In today's digital age, e-commerce has been playing a very important role in areas such as retail, sales automation, and payment services. With huge amounts of data been collected from different e-commerce services available, there are multiple opportunities to use this data to analyze trends and strategize profitable activities. This paper explains the strategic data-driven approach for the improvement of business sales performance and conversion rates of e-commerce websites. This is a modern approach to collect key data metrics and implement cost-effective automation that helps in improving conversion rates and sales performance leading to increased profitability and revenue for business and high satisfaction of customer service. The business-to-consumer (B2C), and business-to-business (B2B) models are explored where issues and challenges like handling logistics and distributions, payment security issues, warehouse management, and reasons to lower sales conversion rate are described. Where suggestive methods to improve conversions and sales by means of performing web-tests, retaining buyers, checkout process optimization, and approaches to increase user trust is discussed.

**Index Terms**— conversion rates, digital payments, e-commerce, online shopping, retail, sales automation.

———————————— ◆ ————————————

## 1 INTRODUCTION

As online shopping is increasingly becoming a part of our daily lives – both personally and professionally, it is also pushing businesses to collect more useful data to understand their customers in order to come up with products that meet their requirements. Usually, third-party analytics applications are an immediate tool to collect such user data in real-time. This collected information such as traffic sources, visitor country, and average time spent on site etc. can be further used to understand audience and model visitors' behaviour and buying patterns. However, few key metrics such as the real-time user activity, abandoned cart rates, and the sequence of the actions performed by these website visitors are usually not considered. Therefore, implementing advanced tools such as heat maps, pixel tracking, and a view of the real-time user session can be of great interest to understand more complex buying patterns [1].

One of the popular e-commerce giants and China's largest e-commerce company, Alibaba Groups Inc., is consistently developing and implementing sophisticated data mining algorithms and retail automation processes that will not only help them in analyzing bulks of data sets collected from different pages of their website but it will also help them to dramatically grow the business [2] [3]. Another e-commerce giant, Amazon Inc. has estimated that 90% of all the data generated by mobile devices such as tablets and smartphones etc. are never analyzed. In fact, Amazon also states that around 60% of this mobile data starts losing its value within milliseconds of being generated [1] [4] [5] [6].

## 2 DISCUSSION

### 2.1 How E-Commerce is different from retail?

Unlike the traditional brick and mortar retail stores, an e-commerce business model is simply an online retail channel where a customer can order a product or a number of products from a merchant via a web-based portal that is identified as an e-commerce website or simply an online store. This e-commerce website uses an integrated or a linked payment processing service that allows the customer to seamlessly pay online through his credit card or an internet wallet service [3].

The e-commerce model can be further classified into many categories but the two most popular and effective among business and consumer groups are (1) Business-to-Consumer (B2C), and (2) Business-to-Business. Fig.1 has illustrated these two most effective categories.

### 2.1.1 Business-to-Consumer (B2C)

Business-to-Consumer e-commerce model can be a retail store selling groceries online to its consumers and it can also be an independent fashion brand selling merchandise to its consumers directly via their e-commerce website. Irrespective of the product been sold, the B2C e-commerce model revolves around the idea of selling directly to the end consumers without the interference of any middle man. For example, Amazon is one of the oldest and the most popular B2C e-commerce marketplaces in the world [4]. Similarly, daraz.pk is one of the biggest e-commerce websites in Pakistan that had been recently acquired by the Chinese giant Alibaba Group Inc. [7].

———————————————————

[1]Department of Computer Science, UBIT, University of Karachi, Pakistan.
[2]Karachi University Business School, KUBS, University of Karachi, Pakistan.
[3]Institute of Business Management, IoBM, Karachi, Pakistan.
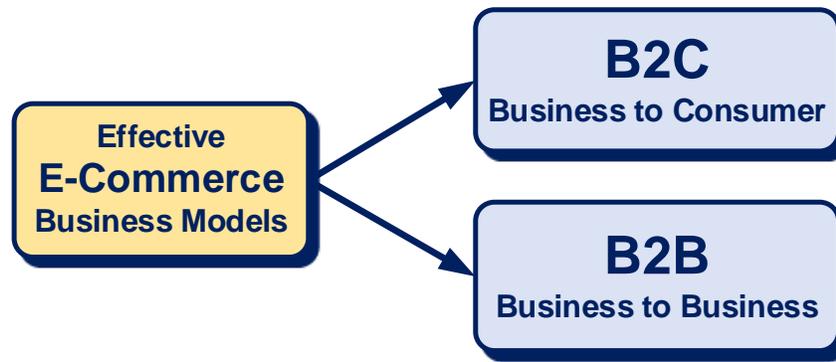
*Corresponding Author: hussainsaleem@uok.edu.pk

Fig. 1. Effective E-Commerce Business Models (1) Business-to-Consumers (B2C), and (2) Business-to-Business (B2B).

### 2.1.2 Business-to-Business (B2B)

The B2B model is quite different from the popular B2C model as the name itself clearly tells. The whole idea of a business-to-business model is to make a buying relationship between two business entities no matter if either of the two is an independent or a large corporate. In fact, the transaction is successfully made without requiring the parties to meet in person. According to Inside Sales Virtual Summit 2013, B2B buyers "don't require face to face contact," as 75% of them are already influenced by social media networks [3] [5].

Alibaba Group Inc., the Chinese e-commerce giant, and the largest B2B marketplace in the world is one such example. Independent retailers, distributors, wholesalers, and even large companies can find suppliers and source products in bulk to sell them. Another few but popular examples of B2B e-commerce models are Tradekey.com, ThomasNet, and IndiaMart etc. [2] [4] [3] [8].

## 3 CHALLENGES IN THE E-COMMERCE SPACE

As the retail industry is operating in a conventional way for decades, and as the current e-commerce model has evolved on the basis of the past retail sector, therefore, the old business mindset and an obsolete operational infrastructure still exists. This results in very little innovation or very few significant improvements limited to specific areas been made, such as the old and costly internet payment gateways are replaced by faster and affordable alternatives like PayPal and Stripe, or retail software getting converted into cloud applications [9] [10] [11] [12] [13] [14]. But overall, the original infrastructure of both the retail and the e-commerce industry has not been evolved that could be considered as a revolutionary change [13] [15] [16]. Fig.2. explores the challenges in the e-commerce web space.

### 3.1 Handling Logistics and Distributions

One of the biggest problems that e-commerce businesses face is the efficient handling of logistics and the distributions network. Most logistics company aren't catered to provide services to the modern e-commerce businesses and therefore, many new e-commerce stores do not meet the requirements of high efficiency and have poor on-time delivery [1] [17].

### 3.2 Payment Security Issues in E-commerce

Payment security in e-commerce has always been under the spotlight. Although the payment gateways and processors have outgrown in terms of their subscriber base and average transaction volume, there is still a lack of secure and stable security systems especially in developing markets like Pakistan [7].

### 3.3 Warehouse Management

When warehouse management staff don't have 360-degree visibility to their inventory, they get into difficulties such as running out of the required stock at the very last minute when there is an immediate demand from the consumers and this directly results in letting the company's cash flow to decrease [15] [18].

### 3.4 Lower Sales Conversions On-Site

A successful "conversion" is one in which the user follows the Call to Action (CTA) and completes the steps that were required to be performed. For example, in order to get more email newsletter subscribers for a brand, a visitor on a website must have to enter his email address and name. Each successful subscription would be counted as a conversion in this case [15]. Similarly, a successful sales conversion for an e-commerce website is counted only when the visitor selects products, add them to the cart, make the payment transaction and complete the checkout process on the website.



Fig. 2. Challenges in the e-commerce web space.

However, in reality, this is one of the most problematic areas for every e-commerce website, especially the new ones in the market, that although receive a decent traffic – some thousands of monthly visitors - to the website but still only a handful of those actually complete the purchase and show a conversion [6] [15] [12].

Down the road, when it comes to online advertising such as Facebook Ads or Google Advertising, specifically for the e-commerce businesses, sales conversion is one of the most important Key Performance Indicators (KPIs) to analyze the user behaviour, engagements and purchases. All of these metrics assist in determining the final return on investment (ROI) from online advertising for the company. In fact, we simply cannot ignore the ROI factor as it is the judging criteria to decide whether a marketing channel should continue to be used for brand awareness or not. Let's say a small amount of $100 for a day was spent on ads that resulted in total 5 sales on the e-commerce website with an average cart size of $150. This could be considered as a profitable ad campaign that gives the return on investment and the company would continue to leverage this marketing channel with higher ad spend [3] [19] [20]. However, what other alternatives would the same e-commerce company take if they spend $1000 for seven days on the same ad campaign but fail to get their return on investment? This is where the concept of improving conversions comes in [21].

# 4 METHODS TO IMPROVE CONVERSIONS AND SALES

Improving conversion rates for any metric in general is called "Conversion Rate Optimization" or CRO for short. This is a series of different procedures and data-driven techniques through which any website, application or even an advert could be improved in order to achieve increased sales and revenue, better usability or higher engagement.

In concern to e-commerce websites, the most important metric that needs to be improved for higher conversions is sales. There are a number of techniques that could be implemented on an e-commerce website through which this could be achieved. Some of these methods are already being practised and some are still in the experimental phase [21]. Fig.3 depicts the methods to improve conversions on sales.

## 4.1 Performing A/B Testing

The method of knowing about the success rate of the website with website visitors in context to design aesthetics, appropriate content, and working functionality is known as A/B testing. It provides the developer to test the variation over the page element or component that directly affect the actions or behaviour of the customer. A continuous iteration until capturing users' best possible version while testing is more effective since each hypothesis is developed based on the results of the previous hypothesis. Testing more consistently improve the overall design of the web so that end users could interact and engage more with the website [22] [23].



Fig. 3. Methods to improve conversions on sales.

Two types of A/B testing are more common which are testing at (1) Client side, and (2) Server side. The client-side testing method is more commonly taken, where usually a common and same page is appended to every visitor side where with the use of JavaScript, every change is recorded within the visitor's browser prior to appending visitor's required page [9] [16] [22] [24] [25]. The server-side testing method is executed on the web server which notices visitors page variations, altered on the server while recording prior the sent to the visitor's web browser without any modification done at the browser.

A/B testing is applied to compare (1) Variations in page layouts, (2) Effectiveness of contents and headlines, (3) Site navigation map organization, (4) Product and website photo contents, (5) Visual styling, and (6) Product promotions, pricing formula etc. Some research tools are also used. Some of the research tools include (1) Analytics, (2) Heat Maps, (3) User Tests, and (4) Surveys [22]. The detail description of research tools is elaborated in Table-1. Thorough customer behaviour is analyzed prior to developing a hypothesis about the website to know how to improve customer surfing experience [26]. Such hypotheses become the basis for the roadmap of the A/B testing [22].

## 4.2 Retaining Buyers using Email Marketing

According to the market study, there is a 27 per cent chance of returning customer, who finish purchasing for the first time via an e-commerce website [27]. For 2nd and 3rd purchase, this chance increased to double i.e. 54 per cent for another purchase from the same venue [21]. The e-commerce website tries to retain its customer knowing CLV – customer lifetime value. They not only retain their info, but they upsell and cross-sell that information. Email marketing is one of the most popularly used ways where most of the customers are under reach [28].

According to the marketing strategy "handle the customer with care", the company use to establish frequent contact with their customer knowing about them, offering schemes, and promotions on sales, and discounts via email for frequent long years, to make them feel like a member of the family. This way customer realizes their value and returns to buy a product again.

**TABLE 1**
**WEBSITE DATA ANALYTICS TOOLS TO OBSERVE CUSTOMER BEHAVIOUR**

| Sr. No. | Tools | Description |
|---|---|---|
| 1. | Analytics | It searches and report the popular and high ranked websites, the complete traffic sources with the paths through the site, and the pages that have high bounce frequency. |
| 2. | Heat Maps | This tool find the exact behaviour of navigation of website, see where user clicked, stopped, paused, and other relevant actions count. |
| 3. | User Tests | During navigation, the frictional nodes are determined through users self test. Finding congestion on node, or any other suspicious activity that are experienced while surfing. |
| 4. | Surveys | Providing service to the customer by asking to fill the forms, recording the site surfing experience rating, and suggestion for improvement questioned. |

Further, the sale of the brand is multiplied 5 to 10 times more as that customer become a merchandizer among their real family or in own friend circle recommending the same brand or company, inspiring by their service. This creates a customer base which grows drastically with referrals and recommendations with the increasing rate of email campaigns reflecting better ROI [28] [29] [30].

## 4.3 Optimizing Checkout Process

Optimizing the entire checkout process is quite a technical game and it requires a lot of testing on the developer's end. Let's understand this process with realistic numbers. An e-commerce website had a separate payment page where 84.71% of the visitor's traffic landed to buy a product. If we increase this percentage to 90%, that would result in generating 461 more orders and an additional USD $87,175 per month. If we take a close look at it, that's a staggering 23.94% revenue increase. Although this could seem small, that's still a gain in revenue [31].

Similarly, another good technique to apply is to make the shopping cart and products added to it along with the "Checkout" or "Order Now" button to remain visible at all the time until the user clicks somewhere else. Also, changing the "Checkout" button colour to something that stands out – mostly yellow or green – is also known to work and could be another advantage.

Implementing the concept of upselling and cross-selling has also proved to work. When customers on popular e-commerce websites such as AliExpress and Daraz adds a product to their shopping cart and proceeds to the checkout page, the website automatically shows them the upsells or in short – targeted products that are highly relevant to what they are buying. For example, if a customer has added a denim jean to his cart, the website might display t-shirts that would look good with that specific jeans. Interestingly, these sites are programmed to dynamically shrink cart contents, so that the upsells stand out from all the other products that are displayed [2] [7] [32].

There are some fundamentals and generally accepted rules for displaying cart contents. These rules are:

### 4.3.1 Visibility

Throughout the buyer's journey, the shopping cart feature should clearly display all the products that are added to the cart and also show the total cost of the basket. The reason behind this is to avoid card abandonments on the checkout page.

### 4.3.2 Control

The customer must have the control to easily make any changes to the product quantity or even remove them.

Another amazingly profitable strategy that many e-commerce business owners today still don't know about is the Cart Abandonment. It is very common to see that most visitors on a website who click on a product to add it to the shopping cart, usually don't complete the checkout process and leave the website without making any purchase. This heavily results in a great loss of sales and revenue.

As a solution, if we do not let the cart contents expire and leverage the technology of cart abandonment email reminders and retargeting ads to bring those potential customers back to the same checkout page can dramatically increase conversions and recover lost sales [28].

The last phase of the checkout optimization is tweaking the payment fields. If the customer has entered the shipping information first, only then they must be able to get into the billing part. This multi-step form process is used to push the customer towards commitment and consistency. The logic behind this is very simple – when a human brain starts doing something, it focuses on the person to eventually finish it. This little psychological hack could significantly add up sales.

## 4.4 Increasing User Trust

Security and online privacy are one of the most important concerns for many of us who are doing business activities or even buying activities online. Customers, especially in countries like Pakistan, still are afraid to use credit or debit cards online to avoid any mishaps or potential theft.

Therefore, it is essential for an e-commerce website of any kind to ensure the use of end-to-end encryption from origin server to the client side via SSL (Secure Sockets Layer) and TLS (Transport Layer Security) certificate.

If an e-commerce website is already using all the required security protocols, it is still important to tell visitors about it by displaying site security seals and PCI (Payment Card Industry) compliant labels prominently on the payment or checkout page. Moreover, a few proven techniques to let customers know that their details are secure are:

1. Using different background colour for payment form – preferably light green colour.
2. Displaying SSL certificate logo or a green padlock icon.
3. An additional written statement with the SSL logo such as: "Payment secured by 256-bit SSL Encryption".

In general, most users are not very technically aware and therefore they probably are not aware of terms like SSL or https secured, so telling them about their data security in plain terms is also a good idea.

## 5 CONCLUSION

E-Commerce websites are in focus of every user who surfs the internet of all age-group. These e-commerce websites gather user's genuine data for their own utilization to increase sale, as well as they upsell or cross-sell their user's behavioral data to other companies as well. The sales performance of these e-commerce websites is required to be improved with a strategic data-driven approach. While investigating the user and business requirements on e-commerce websites, it is concluded that:

- Strategic and visionary business policies are required to come in effect to enhance the commerce especially the improvement in conversion rate, and sales performance on the social web.
- The traditional method of commerce should be replaced by modern technological way of shopping to buy or order the products and services in order to save time and maintain transparency on both sides i.e. (1) Business side and (2) Customer side.
- There are a need to address the challenges of (1) handling logistics and distributions, (2) Payment methods and concerned security issues, (3) Warehouse and inventory automation, and (4) Improvement required in sales conversions.
- The A/B Testing methods should be adopted effectively.
- Efforts should be made to automate email marketing to retain customers to become repeat customers.
- The optimization of the check-out process should be made.
- Strategic approaches should be followed for customer relationship management to effectively increase a user's trust.

## REFERENCES

[1] S. Hernández, P. Álvarez, J. Fabra and J. Ezpeleta, "Analysis of Users' Behavior in Structured e-Commerce Websites," *IEEE Access,* pp. 11941 - 11958, 2017.

[2] G. Anadiotis, "Alibaba: Building a retail ecosystem on data science, machine learning, and cloud," 2017. [Online]. Available: https://www.zdnet.com/article/alibaba-building-a-retail-ecosystem-on-data-science-artificial-intelligence-and-cloud/. [Accessed 2019].

[3] W. Larry, "How Digital Customer Communities Build Your Business," in *Marketing to the Social Web*, New Jersey, John Wiley & Sons., 2009.

[4] B. Jopson, "Amazon urges California referendum on online tax," Financial Times, A Nikkie Company, 2011.

[5] K. Wagner, "The Modern B2B Buyer - A Recap from inside Sales Virtual Summit 2013," SAP Sales Cloud, 2013. [Online]. Available: https://www.calliduscloud.com/blog/events/the-modern-b2b-buyer-a-recap-from-inside-sales-virtual-summit-2013. [Accessed 2019].

[6] H. Saleem, "Mobile Agents: An Intelligent Multi-Agent System for Mobile Phones," *International Organization for Scientific Research - Journal of Computer Engineering (IOSR-JCE),* vol. 6, no. 2, pp. 26-34, 2012.

[7] Daraz, "Delivering Happiness on the Go! Happy Shopping," Daraz/Alibaba Group Inc., 2019. [Online]. Available: www.daraz.pk. [Accessed 2019].

[8] I. Lauren, "How Social Shopping Is Changing Fashion Production," Mashable, Inc., 20 June 2011. [Online]. Available: http://mashable.com/2011/06/19/social-shopping-fashion-production/#JwGalfBKc5qB. [Accessed 2017].

[9] S. M. A. Burney, H. Saleem, N. Mehmood and T. A. Jilani, "Traceability Management Framework for Patient Data in Healthcare Environment," in *3rd IEEE International Conference on Computer Science and Information Technology (ICCSIT)*, Chengdu, China, 2010.

[10] A. M. Rana and H. Saleem, "Novel Integrated Sensor Based Sleep Apnea Monitoring and Tracking System Using Soft Computing and Persuasive Technology for Healthcare Support," *International Journal of Systems Signal Control and Engineering Application (ISSN-p: 1997-5422),* pp. 43-48, 2014.

[11] A. M. Rana and H. Saleem, "Novel Integrated Sensor based Sleep Apnea Monitoring and Tracking System using Soft Computing and Persuasive Technology for Healthcare Support," in *9th International Conference on Innovative Trends in Management, Information, Technologies, Computing and Engineering (ITMITCE – 2014)*, Istanbul, Turkey, 2014.

[12] M. S. A. Khan and H. Saleem, "Proposed Secure Protocol for Online Health System in Cellular Communication," *Karachi University Journal of Science,* vol. 36, pp. 23-26, 2008.

[13] H. Saleem, "Novel Intelligent Electronic Booking Framework for E-Business with Distributed Computing and Data Mining," *International Journal of Computer Science and Network Security, IJCSNS,* 2019.

[14] H. Saleem, Interviewee, *Software Has Become A Driving Force.* [Interview]. 2004.

[15] H. Saleem, K. B. Muhammad, A. H. Nizamani, S. Saleem and A. M. Aslam, "Data Science and Machine Learning Approach to Improve E-Commerce Sales Performance on Social Web," *International Journal of Computer Science and Network Security (IJCSNS),* vol. 19, 2019.

[16] H. Saleem and S. M. A. Burney, "Imposing Software Traceability and Configuration Management for Change Tolerance in Software Production," *IJCSNS - International Journal of Computer Science and Network Security (ISSN:1738-7906),* vol. 19, no. 1, pp. 145-154, 2019.

[17] H. Saleem, S. A. Khan, S. Saleem and A. M. Aslam, "Civil Use of Autonomous Pilotless Aerial Vehicle," *International Journal of Scientific & Engineering Research,* 2019.

[18] H. Saleem, "Review of Various Aspects of Radio Frequency IDentification (RFID) Technology," *International Organization for Scientific Research - IOSR Journal of Computer Engineering (IOSR-JCE),* vol. 8, no. 1, pp. 1-6, 2012.

[19] E. Brown, "21 Open Source Projects for IoT," The Linux Foundation, 2016. [Online]. Available: https://www.linux.com/news/21-open-source-projects-IoT. [Accessed 2017].

[20] K. C. Laudon and J. P. Laudon, Managing Information Systems: Managing Digital Firm, New York: Pearson Inc., 2018.

[21] A. Toporek, "When Customers Stick: Customer Retention by the Numbers (Infographic)," CTS Service Solutions, LLC., 2013. [Online]. Available: http://customersthatstick.com/blog/customer-loyalty/customer-retention-infographic/. [Accessed 2019].

[22] D. Hoos, "A Detailed (Step-By-Step) Look at Effective Ecommerce A/B Testing," BigCommerce Pvt. Ltd., 2019. [Online]. Available: https://www.bigcommerce.com/blog/ab-testing/#why-should-you-do-ab-testing. [Accessed 2019].

[23] A. Burney, N. Mahmood, T. Jilani and H. Saleem, "Conceptual Fuzzy Temporal Relational Model (FTRM) for Patient Data," *WSEAS Transactions on Information Science and Applications (Journal),* vol. 7, no. 5, pp. 725-734, 2010.

[24] H. Saleem, "Towards Identification and Recognition of Trace Associations in Software Requirements Traceability," *International Journal of Computer Science Issues (IJCSI),* vol. 9, no. 5(2), pp. 257-263, 2012.

[25] H. Saleem and F. A. Zaidi, "Identification and Realization of Trace Relationships within Requirements," in *International Conference on Software Engineering (ICSE'06)*, Lahore, Pakistan, 2006.

[26] S. M. A. Burney and H. Saleem, "Inductive and Deductive Research Approach," University of Karachi, Karachi, 2008.

[27] M. Uzunian, "The Importance of Repeat Customers," SA - SumAll, 2013. [Online]. Available: https://blog.sumall.com/journal/the-importance-of-repeat-customers-2.html. [Accessed 2019].

[28] H. Sutton, "Why Retention Emails Are as Important as Sales Emails," GetResponse., 2015. [Online]. Available: https://blog.getresponse.com/why-retention-emails-are-equally-important-as-sales-emails. [Accessed 2019].

[29] Bertha, "Why Retention Emails Are Equally Important as Sales Emails," Bertha's Blog, 2018. [Online]. Available: http://berthastover.blogspot.com/2018/01/why-retention-emails-are-equally.html. [Accessed 2019].

[30] H. Saleem, S. Imam, N. Shah, S. Saleem and A. M. Aslam, "Dynamic Thresholding of Vehicle Activated Signs," *International Journal of Scientific and Engineering Research (IJSER),* 2019.

[31] S. A. Raza, H. Saleem and S. Habib-ur-Rehman, "MCMC Simulation of GARCH Model to Forecast Network Traffic Load," *International Journal of Computer Science Issues (IJCSI),* vol. 9, no. 3(2), pp. 277-284, 2012.

[32] J. Leskovec, A. Rajaraman and J. D. Ullman, Mining of Massive Datasets, Cambridge University Press New York, NY, USA, 2014, pp. 1-20.