

E-Commerce as a Tool for Skill Development and Independence in Individuals with Cognitive Challenges

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Abstract

The rapid expansion of e-commerce has transformed digital marketplaces into structured environments that facilitate not only economic exchange but also skill development and inclusive participation. This paper analyses the application of e-commerce, as an instrument in the skill development and independence promotion and especially in the context of Micro, Small and Medium Enterprises (MSMEs) and how they may be relevant to people with cognitive problems. The quantitative analytical research design was followed on the basis of the Brazilian E-Commerce Public Dataset which included more than 113,000 observations of transactions. The discussion examined the involvement of sellers, variety of products, payment methods and continuity of transactions in the market. The results indicate high levels of MSME involvement and regional concentration, a high level of product category diversification, widespread use of digital payment systems, and a steady flow of orders over time. Such trends show that the e-commerce sites are systemic and sustained ecosystems that enable repetitive interaction in systematic actions. These environments help in acquisition of digital, financial and operational skills by participating on a regular basis. Notably, the orderly and procedural e-commerce operations indicate that it may be applicable to people with impairments in cognition since routine and controllable activities may promote a gradual learning of skills and functional autonomy. Although the dataset does not explicitly measure the variables related to disability, the marketplace dynamics observed give a conceptual framework to perceive e-commerce as an enabling platform to participate in an inclusive manner.

Keywords: E-commerce, MSMEs, Skill Development, Cognitive Challenges, Digital Inclusion

1. Introduction

Modern economic systems have undergone change with the growth of digital technologies, with e-commerce becoming a significant platform in terms of production, exchange, and the delivery of services (Kilay et al., 2022). In addition to its business aspect, e-commerce has come to be an organized digital space that facilitates participation, adaptation and engagement in market oriented activities. Online marketplaces demand various pragmatic skills through activities like product listing, order processing, digital payment procedures, communication with customers, and logistics, among others. These are digital literacy, communication, daily task management, decision-making and financial management, all of which are closely related to the development of skills and autonomy in functioning.

Micro, Small, and Medium Enterprises (MSMEs), in this digital transformation, take center stage as they constitute a significant part of online sellers and play a crucial role in the malleability and heterogeneity of online marketplaces (Almtiri et al., 2023). E-business enables MSMEs to reach further beyond physical borders, reach larger markets and to be part of globalized trading networks. They are also exposed to repetitive exposure of structured digital tasks through their frequent participation in processes in the marketplace and this may build up over time to enhance entrepreneurial, technical, and operational competencies. Therefore, MSMEs do not solely act as economic agents but also as significant contributors to proficient involvement in online commerce systems.

This paper is especially interested in finding out the applicability of these digital spaces to people with learning issues. In most societies, people with disabilities are still experiencing obstacles in education, employment, and income-generating opportunities because they are inaccessible, lack accommodation, and because the traditional institutional environment is inflexible (World Health Organization, 2022). Consequently, there is a growing necessity to find other spaces that enable an organized involvement and gradual building of ability. Such a space could be the e-commerce platforms as they are sometimes repetitive, process-based and manageable, and can be accommodated to individual ability and support needs. The potential of digital platforms has also been highlighted in the literature on platform-based labour and online work, which underscore their ability to establish new fronts of participation that are more flexible and inclusive than those already established by the traditional workplace set-ups (ILO, 2021). These environments might particularly be helpful to people with cognitive impairments as they help them to participate in specified and routine activities. Simple customer interaction, coordination of digital processes, order tracking, stock, payment monitoring, simple repetition, and routine could be opportunities to learn through repetition and routine.

The fast spread of e-commerce, especially in the time of the COVID-19, have only augmented its importance as an inclusion and continuity mechanism (Mensah and Mwakapesa, 2021). With the growth of online marketplaces, digital commerce was becoming increasingly a part of business, workforce, and consumers. This change is significant as it shifts e-commerce to a peripheral business model to a more mainstream setting where learning, participation, and income generation continue to be conducted (Hagerty & Rubinov, 2019). In the case of people who have cognitive difficulties, this normalization opens up new possibilities of participating in economic activities which could be less accessible in the past with some assistance.

In the larger sense, shared prosperity, inclusion and equitable participation has been associated with the digital economy (Ofori, 2021). By developing alternative means of interaction, service delivery as well as economic contribution, the digital systems can decrease structural barriers. Digital inclusion frameworks underpin this perspective, emphasizing that access, readiness, and meaningful participation are vital components of inclusion in modern society (Sevgi, 2021). E-commerce is quite fitting here since it requires both access to the market and reiteration in formal digital activities, which in turn makes it possible to create an environment where learning-by-doing can take place.

A large scale e-commerce data of over 113,000 transaction-level data, high levels of seller participation, a wide variety of products, a wide variety of payment methods and marketplace continuity are the empirical underpinnings of this study. The findings indicate that sellers are highly concentrated regionally, there is wide product variety, the digital payment systems are widely used and the regularity of monthly orders. The above findings reveal that e-commerce platforms are structured and sustained as ecosystems as opposed to transacting areas. As seen through the prism of MSMEs, these ecosystems are a sign of a long-term interaction on the product, payment, and logistics levels. In terms of skills development, they exhibit recurrent operation routines that can facilitate the practice and learning (Almtiri et al., 2023). These repeated and regular patterns imply that e-commerce can play the role of enabling environment of development of capabilities and increased autonomy to people who have cognitive issues.

Although there is growing research on the digital platforms and the role of MSMEs in digital platforms, little focus has been put on e-commerce as a skill-building and independence-creating tool among people with cognitive challenges (Bhatia-Kalluri, 2021). In the literature, all three areas are usually analyzed independently of one another, with little effort to bridge these three areas, namely digital transformation, enterprise development, or disability inclusion. Thus, the current paper fills this gap by focusing on e-commerce with an inclusive perspective and a focus on the MSME-led digital marketplaces as the possible place of organized activity, the development of competencies, and self-sufficiency. The study has the following objectives:

1. To assess the extent of MSME participation in the e-commerce marketplace.
2. To analyze product diversity, payment systems, and transaction patterns within the platform.
3. To evaluate the potential of e-commerce to support skill development and independence among individuals with cognitive challenges.

2. Methodology

2.1 Research Design

In the current research, the quantitative analytical research design will be applied in undertaking the research that explores the importance of e-commerce as a tool of promoting skill development and independence, especially the role that Micro, Small, and Medium Enterprise (MSMEs) can play. This design is suitable as it will allow conducting a methodical analysis of structured marketplace data and facilitates the discovery of tendencies linked with digital involvement, entrepreneurial involvement, and the acquisition of operation skills. Objectivity, consistency, and analytical rigor are ensured by the quantitative framework, thus enabling the study to form a reproducible perception of how MSME-led e-commerce ecosystems can enable them to participate productively and become functional independently.

2.2 Data Source and Sample

The empirical results are grounded on the Brazilian E-Commerce Public Dataset (Olist, 2021), a publicly accessible dataset of the market place on Kaggle. The data is an integrated customer, seller, product, order, payment and logistics data in a large scale e-commerce system. To conduct the current study, the merged dataset format was employed, and the total amount of observations was 113,390, which includes about 95,128 distinct orders, 92,081 customers, and 2,914 sellers. The seller base is a feasible proxy of MSMEs working in a digital commerce environment. The diversity of product line, trading history and geographic dispersion of sellers offers a profound empirical base to explore the order and operation of MSME involvement in e-commerce.

2.3 Variables and Measures

Seller ID, seller location, customer location, product category, order status, purchase timestamp, delivery timestamp, price, freight value, payment type and payment installments are some of the variables that are to be analyzed. The rationale behind selecting these variables is that they reflect the operational architecture of the e-commerce participation, and they

offer quantifiable variables of MSME participation in the digital markets. The scale and distribution of marketplace participation was measured with seller-related variables and the diverse skill domains, such as technical, vocational, creative, digital competencies, were measured with product-category variables. The complexity of marketplace operations and coordination requirements, and customer-facing interaction pattern was interpreted using transactional and logistical variables. This analytical framework perceives skill development and independence through the framework, variety and sustainability of interaction within the ecosystem of digital marketplace.

2.4 Data Processing and Preparation

Quality, consistency and analytical usability of the dataset were ensured by thoroughly examining the data before analysis. Data cleaning processes involved checking the structure of the variables, formatting of categorical variables, standardization of the transactional variables and checking consistency of continuous variables. Variables like order ID, customer ID, and seller ID were retained as identifier variables to be used in the mapping and aggregation. Order status, payment type, product category and geographic indicators were categorical variables that were formatted to facilitate summary and association analysis. The continuous variables like price, freight value and frequency of installment were revised to maintain a stable interpretation of the analytic. These preprocessing procedures yielded a consistent, and structured data that can be analyzed descriptively, comparatively and interpretively.

2.5 Data Analysis

Data analysis was done in several phases to analyze the market place structure and the involvement of MSMEs in the e-commerce environment. First, descriptive statistics were used to overview the key features of the data set such as participation of sellers, distribution of products category, distribution of orders, payment methods, and patterns of logistics. Frequencies, percentages and trends of distributions were employed to present a general view of what is going on in the marketplace.

This was followed by seller level analysis to determine the distribution of MSMEs by region and product segment. An analysis was then done by product-category and transaction to determine the marketplace operational diversity. Listing, pricing, payment management, order fulfillment and coordination of deliveries were variables interpreted to gain insights into the patterns of digital and entrepreneurial engagement. Lastly, transaction continuity and seller activity were investigated to determine the long-term economic involvement and the organization of the marketplace activities.

3. Results

The data includes more than 113,000 transactional-level observations, which reflects a large-scale e-commerce setting with a large number of sellers of different products and geographic areas. The analysis covers MSME involvement, product diversification, structure of transactions and continuity of the market place.

3.1 Descriptive Statistics of Marketplace Variables

The descriptive statistics show that there is a wide variation in important variables of transactional and product related variables. The values of prices and payment are dispersed widely as there are variations in the types of products and the level of transactions. In the same way, freight values and weight of products illustrate the variance in logistics and product properties. These findings emphasize the heterogeneity of marketplace operations, in terms of different pricing schemes, product specifications and terms of transactions as can be seen in Table 1.

Table 1. Descriptive Statistics of Key Variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Price	120.18	182.76	0.85	6735.00
Freight Value	20.02	15.75	0.00	409.68
Payment Installments	2.94	2.78	1.00	24.00
Payment Value	172.24	266.60	0.00	13664.08
Product Name Length	48.80	10.02	5.00	76.00
Product Description Length	785.79	650.99	4.00	3992.00
Product Photos Qty	2.21	1.72	1.00	20.00
Product Weight g	2110.64	3770.38	0.00	40425.00

3.2 MSME Participation Analysis

The seller-level analysis demonstrates the substantial involvement of MSMEs in the digital marketplace. Marketplace activity is regionally concentrated, with a high percentage of transactions occurring in a few states, led by São Paulo (SP),

followed by Minas Gerais (MG) and Paraná (PR). Simultaneously, distributed participation is reflected in the presence of sellers across several states, as shown in Table 2.

Table 2. Top Seller States by Transaction Volume

Seller State	Transactions	Percentage (%)
SP	80,870	71.32
MG	8,815	7.77
PR	8,733	7.70
RJ	4,798	4.23
SC	4,160	3.67
RS	2,203	1.94
DF	919	0.81
BA	679	0.60
GO	527	0.46
PE	462	0.41

3.3 Product Diversity and Marketplace Structure

The data set is very diverse in terms of products and there are several categories indicating various fields of business activity. The most common segmentations are cama mesa banho, beleza saude, esporte lazer and moveis decoracao, which means different levels of involvement in the marketplace, according to Table 3. The findings show that the platform offers extensive commercial activities, with variety in operational engagement in the product segments as shown in Figure 1.

Table 3. Top Product Categories by Transaction Volume

Product Category	Transactions	Percentage (%)
cama mesa banho	11,649	10.27
beleza saude	9,761	8.61
esporte lazer	8,731	7.70
moveis decoracao	8,553	7.54
informatica acessorios	7,897	6.96
utilidades domesticas	7,172	6.33
relogios presentes	6,063	5.35
telefonica	4,601	4.06
ferramentas jardim	4,463	3.94
automotivo	4,283	3.78

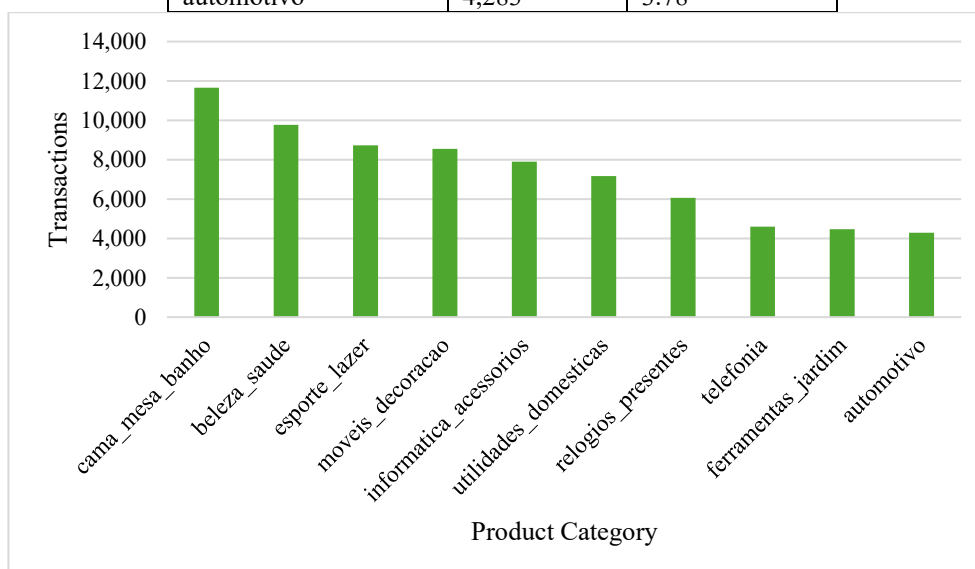


Figure 1. Top Product Categories

3.4 Transaction and Payment Structure

Analysis of the payment reveals that credit card payments are the dominant ones followed by boleto (a Brazilian bank slip payment method), voucher and debit card payments are paying smaller proportions. This allocation shows that there is a well-organized and digitally integrated system of transactions as illustrated in Table 4. The prevalence of digital payment options is indicative of the effectiveness and ease of the transaction systems in the platform as shown in Figure 2.

Table 4. Payment Type Distribution

Payment Type	Transactions	Percentage (%)
credit_card	83,706	73.82
boleto	22,047	19.44
voucher	6,012	5.30
debit_card	1,625	1.43

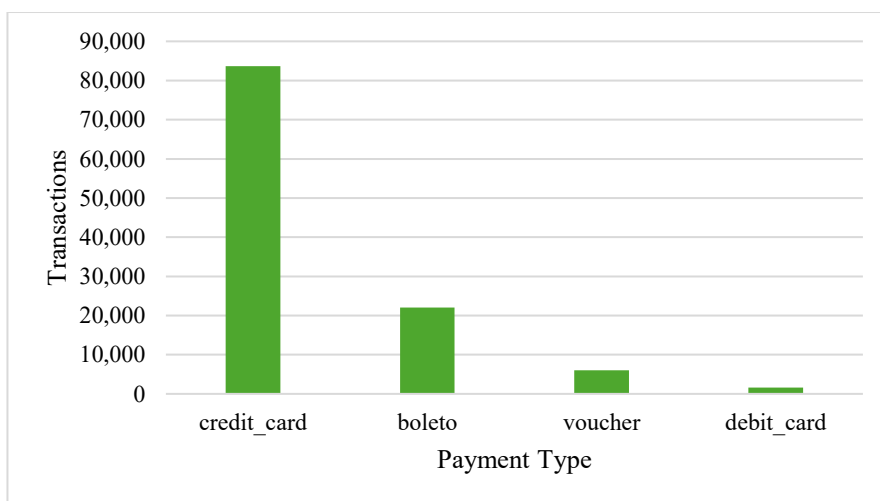


Figure 2. Distribution of Payment Methods in E-Commerce Transactions

3.5 Order Flow and Marketplace Continuity

The monthly order analysis indicates that there is a consistency in transaction within the time frame. It is seen that there is a significant rise towards the end of 2017 and the beginning of the year 2018, which shows growth and active participation in the platform as presented in Table 5.

Table 5. Monthly Unique Orders

Month	Unique Orders
2017-09	4,090
2017-10	4,428
2017-11	7,186
2017-12	5,383
2018-01	6,901
2018-02	6,451
2018-03	6,884
2018-04	6,731
2018-05	6,716
2018-06	6,075
2018-07	6,118
2018-08	6,324

4. Discussion

E-commerce site is an organized online space in which the engagement between sellers, products, transactions and technological platforms determine the participation. The concentration of the sellers on certain areas, as well as their presence in various places, is the demonstration of the capabilities of digital marketplaces to increase these participation levels, without being affected by the infrastructure and accessibility in the region. This trend indicates that MSMEs gain

advantages of e-commerce in the form of breaking down market obstacles of the traditional market that facilitates their belonging to larger economic systems (Mahesh et al., 2022). Meanwhile, the disproportional distribution of the regions emphasizes such enabling factors as digital access and connectivity, which have been identified to affect participation in online commerce (Lin et al., 2021).

The variety of product types that are witnessed in the market place means that e-commerce sites favour a broad economy, which is linked to various forms of skills and competencies. The implication of participation in numerous product lines is that of involvement in the diverse operational activities, such as sourcing, listing, pricing and customer interaction. This diversity is an indicator of the flexibility of the MSMEs and the possibility of functioning in various areas and thus the cultivation of practical and entrepreneurial skills. The pattern is comparable to the studies that indicate that the environment of e-commerce can increase the capability of enterprises and support sustainable interaction with digital systems due to the ongoing interaction with digital systems (Amornkitvikai et al., 2022). In these regards, the concept of product diversity can be understood as the attribute not only of the commercial aspect but also of the sign of the ability-related involvement in the marketplace.

The prevalence of online payment systems, especially credit card payments signifies the technological aspect of the platform. Dealing with payments is a key aspect of e-commerce activities and it needs users to acquire skills pertaining to money management and processing of online transactions. These systems are highly adopted, which is also associated with the high rates of digital adoption, as the studies have underlined the significance of payment technologies in enhancing the efficiency and operational performance of MSMEs (Kaur and Devi, 2022). Learning to work with digital payment systems helps to develop financial literacy and be able to independently engage in the processes of the economy. The order flow consistency and the constant amount of transaction activity make over time are evidence that the marketplace is a continuous and constant system. This continuity is critical in strengthening participation since consistent engagement in the structured processes enables users to become familiar with it and enhance effectiveness. The performance of routine based activities like order processing, inventory coordination as well as communication with the customers are part of the gradual development of routine-based skills. This trend helps to argue that the adoption of technology can improve the business continuity and the resilience of the business, especially in the dynamic and uncertain environment (Kumar and Ayedee, 2021). Constant transaction is also an indicator of long term involvement, which is vital to not only economic stability but also in the reinforcement of skills.

Inclusion-wise, e-commerce activities are structured and repetitive, which is especially applicable in case of those individuals that experience cognitive difficulties. The workflows that come with digital commerce like listing products, tracking orders, and making transactions can be predicted, which offers chances to engage in a manageable and well-defined work. These attributes render e-commerce products to be the right platforms where the development of skills gradually through repetition and practice can take place. The existence of stable patterns of transactions and standard procedures imply that these platforms can facilitate the formation of capabilities and autonomous operation, particularly, when it is facilitated and directed.

Its increased importance as an important tool of economic involvement and survival has also been supported by the larger increase in digital commerce, especially during the COVID-19 period (Mensah and Mwakapesa, 2021). The heightened use of digital platforms has stimulated the use of new technologies by MSMEs and transformation of their operations, which contributes to their resilience and competitiveness. This shift signifies the increasing significance of digital systems in determining economic performance and makes the process of introducing technologies relevant to surmount the challenges of operations. At a macro level, these developments lead to a common prosperity and inclusive growth as they allow more people to be engaged in economic activities .

Digital inclusion frameworks also underline the essentiality of access, preparedness, and engagement in the process of shaping engagement in the modern economies. The e-commerce platforms are in line with these principles as they offer a systematic platform where individuals and businesses can engage, learn, and contribute. Being the main actors of these ecosystems, MSMEs can enjoy the benefits of digital transformation in terms of operational potential and the increase in the availability of markets (Almtiri et al., 2023). Nevertheless, other aspects like lack of participation digital skills and technological limitations can still have an impact on the sustainability of participation as has been emphasized in previous studies.

5. Conclusion

The e-commerce platforms are also increasingly shifting beyond being transactional systems to formulated digital environments that enable participation, learning, and building of capabilities. The findings of this paper indicate that marketplaces led by MSMEs develop formal and repeatable systems of operation that have the potential to sustain the emergence of practicable skills by engaging in a consistent manner. They are typified by standardized processes, a variety of product areas, and integrated payment systems, which all play a role in the development of digital, financial and managerial competencies. One of the insights that come out of this study is that due to the structure of e-commerce activities, i.e., listing, ordering and handling of transactions, individuals have a unique chance to explore routine based

activities that facilitate learning through repetition. This aspect especially applies to those with cognitive difficulties, where it coincides with the necessity to have predictable, controllable, and controlled types of interaction. In that regard, the e-commerce platforms may be considered informal but good skills acquisition and functional independence ecosystems. Moreover, the perpetual presence and existence of transactions in the market place underscore the prospects that digital commerce has in facilitating long term involvement as opposed to short term involvement. This continuity is needed to develop confidence, autonomy and economic independence. But to fulfill this potential, the supporting digital infrastructure, the inclusive design and the focused interventions are needed to make it accessible to a variety of user groups.

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