AUTISM AND LAST MILE IN E-COMMERCE

AUTISMO E LAST MILE NO E-COMMERCE

AUTISMO Y LA ÚLTIMA MILLA EN EL COMERCIO ELECTRÓNICO

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ABSTRACT

There are a several obstacles that can make it difficult to structure a last mile in e-commerce. The objective of this study is to identify the main challenges that impact the last mile and answer the following question: "can the restricted interest of the professional with autism spectrum disorder optimize the last mile for e-commerce? The hypothesis to be tested is that autistic professionals can bring unique and valuable skills. The methodology used followed the steps of observation, problem elaboration, bibliographical research, data tabulation through non-parametric tests, data analysis and discussions. The result found is that both customers and managers want more attention in picking, packing, and routing, giving rise to skills of restricted interest, that is, the person who focuses on it, being a technical specialist. One of the greatest virtues of the person with autism spectrum disorder (ASD) is the restricted interest.

Keywords: Last Mile; E-commerc; ASD.

RESUMO

Há uma série de obstáculos que podem dificultar a estruturação de um *last-mile* no e-commerce. O objetivo deste estudo é identificar os principais desafios que impactam o *last-mile* e responder a seguinte pergunta: "o interesse restrito do profissional com transtorno do espectro autista pode otimizar o *last-mile* para o e-commerce? A hipótese a ser testada é a de que profissionais autistas podem trazer habilidades únicas e valiosas. A metodologia utilizada seguiu os passos da observação, elaboração do problema, pesquisa bibliográfica, tabulação de dados através teste não paramétrico, análise dos dados e discussões. O resultado encontrado é o de que tanto clientes quanto gestores desejam mais atenção no *picking, packing* e roteirização, ensejando habilidades de interesse restrito, ou seja, a pessoa que se fixa nele, sendo um especialista técnico. Uma das maiores virtudes da pessoa com transtorno do espectro autista (TEA) é o interesse restrito.

Palavras-chave: Last-mile; E-commerce; Transtorno do Espectro Autista;

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RESUMEN

Hay una serie de obstáculos que pueden dificultar estructurar una última milla en el comercio electrónico. El objetivo de este estudio es identificar los principales desafíos que impactan en la última milla y responder a la siguiente pregunta: "¿puede el interés restringido de los profesionales con trastorno del espectro autista optimizar la última milla para el comercio electrónico? La hipótesis para probar es que los profesionales autistas pueden aportar habilidades únicas y valiosas. La metodología utilizada siguió los pasos de observación, elaboración de problemas, investigación bibliográfica, tabulación de datos mediante pruebas no paramétricas, análisis de datos y discusiones. El resultado encontrado es que tanto los clientes como los gerentes desean mayor atención al *picking, packing* y ruta logística, dando lugar a habilidades de interés restringido, es decir, que la persona que se enfoca en ello sea un técnico especialista. Una de las mayores virtudes de las personas con trastorno del espectro autista (TEA) es su interés en algo.

Palabras clave: Última milla; Comercio Electrónico; Trastorno del Espectro Autista.

1 INTRODUCTION

The consumer's demand for last mile logistics in e-commerce is increasingly latent, as he is used to fast deadlines and technological facilities. Currently, many expect to have access to real-time tracking of the order, for example.

Called last mile logistics, the last stage of the delivery process is one of the most important in the distribution chain. It is at this moment that the consumer receives the order made through e-commerce. In this way, it is essential to guarantee a fast, safe and efficient process to ensure customer satisfaction with the purchase in your virtual store.

Autistic professionals can make interesting contributions in the last mile, especially in picking, packing and routing operations, but many companies are still not taking advantage of the full potential of these professionals due to barriers such as the lack of understanding about autism and the lack of training programs and support.

Although people with autism have different skills such as attention, many adults are unemployed. The literary review focused on attention skills, autism, last mile and e-commerce and the bibliography used was that of Alonso (2023); Calabro (2023); Katou et. al (2023); Katou (2021); Gonzales et. al (2023); Hagberg and Hulthén (2022); Lottu (2022); Molina (2022); Stevenson (1981); Walkowiak (2021); Wang (2023); Zhang-Zhang (2022).

The objective of this study was to identify the main challenges that impact the last mile and answer the following question: "can the restricted interest of professionals with autism spectrum disorder optimize the last mile for e-commerce?"

The result was that both customers and managers want more attention in picking, packing and routing, giving rise to skills of restricted interest, that is, the person who focuses on it, being a technical specialist. One of the greatest virtues of the person with autism spectrum disorder (ASD) is restricted interest.

2 THEORETICAL BACKGROUND

The part of the bibliographic review is the step that refers to the reading and theoretical basis of this work. In this way, it is important for this study several ideas and concepts obtained from the works used as reference.

2.1 People Management

It is necessary to focus on people as the infinite source of valuable, rare, inimitable and organizational resources, as knowledge workers, to create, transfer, convert and manage knowledge flows continuously (ZHANG-ZHANG; ROHLFER; VARMA, 2022).

In the last decade, there has been a great deal of interest in theory and research on organizational ambidexterity. Organizational ambidexterity is the company's ability to maintain a high degree of operational efficiency while having a high degree of innovation (KATOU; BUDHWAR; PATEL, 2021).

According to Molina (2022) the association of innovative models, competitive talents with qualities or skills to relearn and that favorably impact the global environment is fundamental.

2.2 Attention: a cognitive skill

Choosing the ideal candidate to compose the company's team is one of the most faced challenges in the recruitment and selection of professionals. To achieve the desired results, tools can be used to help understand the candidate's profile, such as psychological assessment. Among them, the AC test stands out, better known as the concentrated attention test (MOLINA, 2022).

As its name suggests, the concentration test is a psychological test used to determine a person's ability to remain focused and attentive for a period in different situations. All positions require logical thinking, whether it's about carrying out day-to-day tasks or dealing with occasional problems. The difference is the level that this type of reasoning must reach (ZHANG-ZHANG; ROHLFER; VARMA, 2022).

Assessing attention can be helpful in several different areas. Academic areas to know if a student has difficulty studying or needs to take additional breaks. Clinical or medical areas to know if a patient can carry out their daily activities independently and safely. Professional areas to know if a worker can perform certain functions correctly or if he will be able to pay attention and work properly throughout the shift (KATOU; BUDHWAR; PATEL, 2021).

2.3 Autism

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by atypical development, behavioral manifestations, deficits in communication and social interaction, repetitive and stereotyped behavior patterns, and may present a restricted repertoire of interests and activities (ALONSO, 2023).

The etiology of autism spectrum disorder remains unknown. Scientific evidence points out that there is not a single cause, but the interaction of genetic and environmental factors. The interaction between these factors seems to be related to autism (WALKOWIAK, 2021).

Studies have shown that many patients with ASD do not receive this diagnosis until they are adults, and other studies suggest that for so many children diagnosed with ASD, there are probably just as many undiagnosed. ASD presents a variety of clinical signs and symptoms, depending on variables such as: gender, age and, most importantly, psychiatric comorbidities that, in many cases, are the main cause of delay in diagnosis (LOTTU; et al, 2022).

2.3.1 Asperger's Syndrome

According to Lottu; et al (2022) Asperger syndrome (AS) is a neurodevelopmental disorder that manifests itself with abnormal social functioning, stereotypes, and limited range of interests. Although included in the large family of autism spectrum disorders (ASD) as described in the DSM-5, patients diagnosed with Asperger syndrome do not have language impairment or impaired general cognitive function.

2.4 Logistics

Within last mile logistics there is the activity of picking, which consists of collecting and combining non-unit loads to configure a customer's order. It can be carried out practically in any type of warehouse and it happens from the moment it is necessary to gather packages, parts, products or materials to transfer them once aggregated.

Last-mile logistics assumes increasing importance in the dynamics of many cities, given the growth experienced by e-commerce in recent years, especially during and after the COVID-19 outbreak (GONZALEZ; GARRIDO; VASSALO, 2023).

Last-mile logistics is a recent but rapidly growing phenomenon due to the spread of e-commerce and the increase in the number of deliveries between businesses and consumers. The growth of this phenomenon can be attributed mainly to the worldwide spread of digital technologies - in particular the Internet - which, thanks to online shopping, facilitate distance shopping (CALABRO; et al, 2023).

According to Calabro et. al (2023) fragmented door-to-door deliveries carried out by different private companies generate negative externalities, hindering sustainability. Its economic efficiency is affected by delivery failures, low vehicle occupancy rates and long distances traveled. From an environmental point of view, logistics vehicles contribute up to 50% of particulate matter (PM and nitrogen oxide (NOx)) emissions in cities and are also responsible for 40% of transport-related CO_2 emissions.

Door-to-door deliveries require routing, which is the process of defining paths (routes) for deliveries or collections to be carried out and services provided. The router is used to reduce logistical operating costs related to the route, which can be linked to time, distance traveled or quality of roads.

Hagberg and Hulthén (2022) discuss how last mile logistics in e-commerce has handled errors in terms of time, place and form. Taking the Swedish context as a starting point, the document calls for further research that combines country-specific studies, examining the similarities and differences in last mile logistics, particularly with regard to the factors that allow or hinder consolidation, as well as the need for close attention to details of activities.

2.4.1 Last mile

Last mile is the final delivery step for goods purchased online. This phase consists of the process of transporting the order, from the distribution center to the final destination, that is, the customer's address - whether an individual, in the case of a B2C e-commerce, or a legal entity, in the case of a B2B transaction. It is in the last mile that the consumer has visibility of the logistical process, being able to monitor the delivery of his order. It is one of the most important operations in the supply chain and also one of the most expensive ones (GONZALEZ; GARRIDO; VASSALO, 2023).

2.4.2 Challenges that impact the last mile

There are a number of obstacles that can make it difficult to structure a quality last mile. The main challenges faced by e-commerces, in this sense, are: Unforeseen delivery: there are situations that can impact security and delivery time. This is the case of heavy traffic, lack of drivers, weather conditions, highway tolls, cargo theft and road works, for example; Absence of the customer: when the customer is not at home to receive the order, it is necessary to make another delivery attempt, which demands more costs and increases the risk of breakdowns and loss of products; Consumer demand: buyers are increasingly used to fast deadlines and technological facilities. Currently, many expect to have access to real-time tracking of the order, for example; High costs: without logistical planning, the operation may have even higher costs in the last mile, compromising the business's profit margin (HAGBERG E HULTHÉN, 2022).

2.4.3 First mile and middle mile

The process of delivering goods consists of three steps: first mile, middle mile and last mile. As the name already indicates, the first mile is the initial phase of this chain, referring to the transport of the product from the manufacturer to distribution centers (DCs), warehouses or collection centers. The middle mile is the intermediate step in the process. It involves the transfer of goods, either between distribution centers or from a warehouse to a DC, for example. In physical retail, it can also refer to the arrival of the item at the point of sale. It is worth noting that the middle mile is a stage that may or may not exist in the logistics chain, depending on the operation and needs of each company (CALABRO; et al, 2023).

2.5 E-commerce

According to many governments and international non-governmental organizations in various developing countries, e-commerce is an effective approach to improve economies (WANG, 2023).

In e-commerce there is the Packing activity, which is the process of packing and labeling the products that will be sent to the customers. This process is very important in logistics, as it ensures that the products arrive in good condition and prevents damage, loss and complaints. Packing involves placing the items in suitable packaging and other security measures that ensure that the goods arrive at their destination preserved.

E-commerce is a huge component of the digital economy as the business market landscape is now based on digital competition. Electronic commerce helps in national development through job creation and import tax. However, developing countries are lagging behind in e-commerce adoption due to Internet challenges, trust and security concerns over online payment facilities.

2.5.1 Importance of the last mile for e-commerce

Product delivery is a decisive process for the consumer experience with e-commerce. After the entire purchase process, this is the long-awaited moment when the customer finally has contact with the purchased item. Product delivery is a decisive process for the consumer experience with e-commerce. After the entire purchase process, this is the long-awaited moment when the customer finally has contact with the purchased item. Otherwise, they will have a negative experience with the store, which can lead to harmful evaluations on the internet, damage to the brand's reputation and, consequently, damage to customer loyalty and the generation of repurchases (WANG, 2023).

2.6 Mann-Whitney U test

Stevenson (1981), says that in statistics the Mann-Whitney U test (also known as Wilcoxon rank sum test, Wilcoxon-Mann-Whitney test or Mann-Whitney test) is a non-parametric test applied to two samples independently.

The Mann-Whitney test was used to test the heterogeneity of two ordinal samples. The initial approach is:

Observations from both groups are independent.

Observations are ordinal or continuous variables.

Under the null hypothesis, the distribution from both groups is the same.

Under the alternative hypothesis, the samples' values tend to exceed those of the others: $P(X > Y) + 0.05\ P(X = Y) > 0.05$.

The test has the following formula:

$$u_1 = n_1.\ n_2 + \frac{n_1\ (n_1+1)}{2} - T_1\ ou\ u_2 = n_1.\ n_2 + \frac{n_2\ (n_2+1)}{2} - T_2 \tag{1}$$

where the standard deviation is:

$$\sigma_u = \sqrt{\frac{n_1.\ n_2(n_1\ +\ n_2 + 1)}{12}} \tag{2}$$

The average is calculated as follows:

$$\mu(u_1) = \mu(u_2) = \frac{n_1.\ n_2}{2} \tag{3}$$

The z table looks like this:

$$z = \frac{u_1 - \mu(u)}{\sigma\ (u)} \tag{4}$$

Knowing that:

u_1 = sum of ranks

$n_1\ e\ n_2$ = sample size of the two samples

$T_2\ e\ T_2$ = sums of ranks

N = total number of observations = $n_1 + n_2$

σ_u = standard deviation

μ = average of ranks

z = z test

3 METHOD

The stages of the scientific method used can be represented in this way: observation > problem elaboration > hypothesis raising > experimentation > analysis of results > conclusion.

In the observation, the senses were applied to both the last mile and the person with autism spectrum disorder (ASD), in order to study them in the way they present themselves in reality and in their nature.

From this careful look, the elaboration of the problem began and the following was selected: "can the restricted interest of the professional with autism spectrum disorder optimize the last mile for e-commerce?"

To try to answer the question of the problem, we tried to work in the stage of raising the hypotheses. Prior knowledge was used to assume plausible answers to the questions. For this reason, this stage required complete care on the part of the researchers, as poorly prepared hypotheses would compromise the next stage. The hypothesis tested was that: "the restricted interest of the autistic is an interesting skill for the last mile of e-commerce".

In the experimentation stage, the energies were all directed to the bibliographical research and to the experiments that should confirm or refute the raised hypothesis. Therefore, uniting theory and practice, it was necessary to try to find answers to each question. Data was collected through forms applied to logistics managers and consumers.

A questionnaire was prepared with five questions, numbered from A to E. The attention test was consulted on the Psicanálise Clínica (2023). After that, validation was carried out by two experts, with experience with people with ASD. After analysis by experts, the questions were validated.

Then it was time to analyze your results. At this stage, it was necessary to check whether what was gathered was sufficient to explain each of the problems, according to the initial hypotheses. Also, it was decided whether there was a need to raise new hypotheses, which would trigger more research and more experimentation. Or if, on the other hand, the results were satisfactory and sufficient to reach the conclusion. Finally, from everything that was researched and analyzed, it is at this stage of the scientific method that the result was found.

4 RESULTS AND DISCUSSION

Attention tests were performed between neuroatypical people (ASD) and neurotypical people. A quiet, clean and airy place was chosen, so that they could perform the exam in peace.

There were five days of testing with groups made up as follows (Table 1).

Table 1 - groups of people with ASD and neurotypical people

Day	People with ASD	neurotypical people	total people
1	4	4	8
2	5	4	9
3	6	4	10
4	7	4	11
5	8	4	12

Source: the authors

Attention is one of the first and most important aspects of studying at home or at school. When you study, you need to be mindful and pay attention to what you are reading or listening to. Constant attention is especially important for studying because reading the same information while trying to learn can become tedious and monotonous after a while. Constant attention helps you focus on studying for hours, preventing you from getting lost or forgetting the information you read.

Attention is also essential for any type of work, from office positions that require a certain amount of reading or writing, to air traffic controllers, athletes, cashiers, drivers, doctors and CEOs. All professions require all kinds of attention.

We use attention in our everyday lives to accomplish countless tasks. From the moment we get up to the moment we go to bed, we are constantly using different types of attention. Being short minded can cause you to forget what you're doing, throwing the spoon in the trash and putting the empty container in the fridge. Avoiding this, reading, watching a movie, cooking, bathing, or meeting friends requires attention.

Questions were formulated to test the attention of the participants each day, as follows:

A. What do you put in a toaster oven?

Although it may seem like a stupid question, this is an interesting question to ask. Imagine that you wake up in the morning and immediately go to the kitchen to make your coffee. To use the toaster, between bread, cake, pork rinds and toast, what would you put. The answer here would be the bread, not the toast, much less the rest. That's because toast is a more hardened piece of bread, reaching that state through heat. That's why you put bread in the toaster: so that it heats up, loses water and becomes toast.

B. What to do first?

Imagine that, unexpectedly, the power in your house goes out and you are left in the dark. However, you have a box of matches in your hand and you are next to the gas stove and a candle. Under such circumstances, which one do you light first? The correct answer to this attention test is match. In this situation, you will not be able to light the stove or candle without the help of matches in your hand. Another very simple question that catches many individuals by the surprise of logic..

C. When will it end?

Imagine that you suddenly became ill to the point where you needed medical help. After the consultation, he says that he needs to take 3 pills with an interval of 10 hours between each one. If you start now, how long will it take to finish your treatment? In less than a day, more precisely 20 hours, you will be treated. Think: if you start taking it now, the next one comes after 10 hours and there will be another 10 hours until the last one. So, adding it all up, you would take the pills in 20 hours.

D. What weighs more?

Imagine that you have 1 ton of stones, 1 ton of iron and 1 ton of cotton in your backyard. You need to get them out of there, and you need to deal with the one with the most mass first. So which one weighs more? Well, if your attention is good, you noticed that they all have the same weight. As simple as it is, the test manages to fool many.

E. What would take up more space in your home among stones, iron and cotton?

While iron has a greater concentration of mass, stones are groupable and cotton occupies enormous spaces. This difference in size, even with equal weights, confuses people.

The results were as follows (Table 2).

Table 2 - results of people with ASD and neurotypical people

Day	people with ASD	neurotypical people	total people	mistakes
1	4	4	8	5
2	5	4	9	4
3	6	4	10	3
4	7	4	11	2
5	8	4	12	1

Source: the authors

According to table 2, it is possible to observe that the number of errors decreases as the number of people with ASD in the group increases. If human resources professionals have a series of relevant information involving characteristics that directly affect performance and delivery, then the possibility of decisive recruitment is high.

In view of this, propositions were organized on google drive for two different groups of people to verify which is the error that most challenges last mile logistics in e-commerce.

A group of consumers was compared to another group of logistics managers with a confidence level of 95% (z=1.96), so it was possible to say (H_0) that there is no difference in the reasons for the last mile logistics challenges in e-commerce.

The propositions were as follows:

"mistakes in social interaction, rudeness or too much lapse"; "professional who does not have social interaction with the whole team";

"attention errors, resulting in the wrong or damaged product and delivery at the wrong time or day"; "professional without attention to picking, packing and routing";

"communication errors, causing confusion on the phone or on the customer's channels"; "a professional who does not have the ability to communicate daily with internal and external audiences".

The three main reasons stated by people were: 1°) "attention errors, resulting in wrong or damaged product and delivery at the wrong time or day"; "professional without attention to picking, packing and routing" (six people); 2) "communication errors, causing confusion on the phone or on the customer's channels"; "a professional who does not have the ability to communicate daily with internal and external audiences" (four people); and 3rd) "mistakes in social interaction, rudeness or too much lapse"; "professional who does not have social interaction with the whole team" (three people).

As the ATTENTION ratio appears six times, their ranks are: 1, 2, 3, 4, 5 and 6, which must be replaced by the average rank: [(1+2+3+4+5+6) /6] = 3.5. As the COMMUNICATION ratio appears four times, its ranks are: 7, 8, 9 and 10. Thus, these ranks must be replaced by the average rank: [(7+8+9+10) /4] = 8.5. As the SOCIAL INTERACTION ratio appears three times, its ranks are: 11,12 and 13. Thus, these ranks must be replaced by the average rank: [(11+12+13) /3] = 12.0.

Table 3 - Errors that challenge the last mile in e-commerce for the Wilcoxon-Mann-Whitney test

REASONS		POSTS	
consumers	managers	consumers	managers
ATTENTION	COMMUNICATION	3,5	8,5
ATTENTION	ATTENTION	3,5	3,5
COMMUNICATION	ATTENTION	8,5	3,5
ATTENTION	ATTENTION	3,5	3,5
COMMUNICATION	SOCIAL INTERACTION	8,5	12,0
SOCIAL INTERACTION		12,0	
SOCIAL INTERACTION		12,0	
COMMUNICATION		8,5	
$N_1 = 8$	$N_2 = 5$	$T_1 = 60$	$T_2 = 31$

Source: authors

Using the data in table 3, it is possible to calculate:

$$\mu(u) = \frac{8 \times 5}{2} = 20 \ ;$$

$$\sigma(u_1) = \sqrt{\frac{8 \times 5 \times (8 + 5 + 1)}{12}} = 6{,}90;$$

$$\mu(u_1) = 8 \times 5 + \frac{8 \times (8+1)}{2} - 60 = 16{,}0;$$

$$\mu(u_2) = 8 \times 5 + \frac{5 \times (5+1)}{2} - 60 = 24{,}0.$$

It should be noted that the average rank of consumers (16.0) and the average rank of managers (24) are equidistant from the average of 13 people (20.0). This means that the average of the two averages equals the overall average: $[(16 + 24)/2] = 20$.

Finally, $z = \frac{16{,}0 - 20}{6{,}90} = $ -0,580 or $z = \frac{24{,}0 - 20}{6{,}90} = 0{,}580$

Applying the Wilcoxon-Mann-Whitney test, a significance level of 5% is usually adopted (2.5% in each tail, two-tailed test), which corresponds to the value of z = 1.96 in the normal distribution. As the z value found (0.580 in absolute value) is less than 1.96, it is not possible to reject the null hypothesis H_0. Therefore, it is accepted. Thus, it is concluded that there is no difference, at a significance level of 5%, between the errors that most disrupt the last mile in e-commerce according to two different groups of people, consumers and logistics managers. Lack of attention is the error that most complicates this operation.

4.1 Discussion

With this, the most relevant attention data for the work of last mile logistics stands out and, even if they are not hired, they will remain on the company's radar in search of future opportunities.

The use of data obtained in the concentration test increases the chances of new employees with ASD performing tasks satisfactorily, minimizing the chance of frustration with daily work, reducing turnover and errors in the last mile operation in e-commerce.

Even though it's something of simple idealization, many people have difficulty concentrating on something, unlike people with ASD who have restricted interests and concentrate more. However, it is possible to hone perception for more complex tasks using some mental resources.

The attention test serves only to test mental reflexes in the face of certain questions. However, this does not necessarily indicate that the person is more or less intelligent than the other person. You shouldn't blame someone if you get a few questions wrong or more than you'd like. However, it was an excellent mental exercise to identify logical abilities in a very plural and creative way with neurotypicals and neuroatypicals.

All positions require logical thinking, whether it's about carrying out day-to-day tasks or dealing with occasional problems. The difference is the level that this type of reasoning must reach.

The concentration test shows recruiters how well the candidate is logical and whether he meets the requirements for a vacant position. This can be measured by the final score, the time taken to complete the test, the candidate's assessment behavior and other indicators.

5 FINAL CONSIDERATIONS

In general, if concentration is important for the performance of the activity, employees should concentrate and not ignore some important issues. For example, this is the case for people who deal with numbers, codes or content reviews. If there is an error, payment may be made incorrectly, the program may crash, or misspelled text or inconsistent information may be released to the market.

If the selection process is methodical, specially planned, it is possible to determine the true situation of the candidate. This increases the opportunity for recruiters to get the right job match. To screen candidates correctly, recruiters must be very clear about the profile information the company is seeking. After all, it is through them that the HR team is able to plan an appropriate selection process, whose objectives can define the necessary professionals.

People with TEA have concentration skills that can optimize the last mile in e-commerce in order to plan all processes involved in delivery, standardizing a logistics routine within the company. Order management, as well as picking and packing, that is, the separation and packaging of orders, are essential to ensure last mile efficiency.

For those who work with their own logistics, another strategy that people with ASD can carry out is to control the delivery routing system, which takes into account road conditions in real time to define the most strategic routes for each delivery.

It is essential to make an accurate delivery estimate when the customer completes the purchase. However, in the event of unforeseen events, people with ASD may stick to transparently placing information in the system about the problem, inserting apologies for the unforeseen event and inserting a new deadline. Having a tracking system is also essential so that the customer can follow the delivery steps and the location of the order in real time.

The last mile must be constantly monitored to find new points of improvement and continuously optimize the process. With the help of technologies and logistics systems, people with ASD can monitor the performance of e-commerce deliveries. Thus, he will be able to identify processes that need to be adapted, reduce operating costs and evaluate the quality of services provided by suppliers.

Undoubtedly, the last mile is a process that deserves special attention within the logistics operation. Therefore, as shown in this study, people with ASD have skills of restricted interest that generate more attention in last mile logistics in e-commerce, reducing losses and complaints. It is hoped that other researchers in the future, when different hypotheses and different experiments always bring the same result, start to consider this result as scientific truth and consider people with autism spectrum disorders in functions of picking, packing and routing, as these require attention as a predominant technical skill.

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