


ANALYSIS OF PAYMENT METHODS FOR A CANDY DISTRIBUTOR USING BI TOOLS

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 13 January 2023</p> <p>Accepted 07 March 2023</p>	<p>Purpose: The present work aims to analyze the payment methods of a candy distributor in order to offer a Decision Support System.</p> <p>Theoretical framework: In today's world, the need to stand out and reduce waste by companies in the market is increasing. Thus, new ways to help companies in this mission have emerged, such as decision-making tools.</p>
<p>Keywords:</p> <p>BI; Dashboard; Google Sheets; Google Data Studio; Payment Mean.</p> 	<p>Design/methodology/approach: The methodology used was exploratory in nature, and the forms of approach encompassed both the qualitative and the quantitative.</p> <p>Findings: As a final result, it was possible to obtain a dashboard in which all forms of payment are evaluated and compared, also showing the loss rates with credit and debit cards.</p> <p>Research, Practical & Social implications: It is expected that dashboards will be crucial to store and display the data collected about the payment methods, allowing better visualization of these and supporting the decision-making, besides being easy to handle and apply on a daily basis.</p> <p>Originality/value: It was seen that the dashboard tool is in increasing use, due to its high versatility, applicability, capacity, and competence in delivering what it proposes, the visualization of data.</p> <p>Doi: https://doi.org/10.26668/businessreview/2023.v8i3.952</p>

ANÁLISE DAS FORMAS DE PAGAMENTO DE UM DISTRIBUIDOR DE DOCES UTILIZANDO FERRAMENTAS DE BI

RESUMO

Objetivo: O presente trabalho tem como objetivo analisar as formas de pagamento de uma distribuidora de doces a fim de oferecer um Sistema de Apoio à Decisão.

Referencial teórico: No mundo atual, é cada vez maior a necessidade, por parte das empresas no mercado, de se destacar e reduzir o desperdício. Assim, surgiram novas formas de auxiliar as empresas nessa missão, como as ferramentas de tomada de decisão.

Desenho/metodologia/abordagem: A metodologia utilizada foi de natureza exploratória, e as formas de abordagem englobaram tanto o qualitativo quanto o quantitativo.

Resultados: Como resultado final, foi possível obter um dashboard no qual são avaliadas e comparadas todas as formas de pagamento, mostrando também os índices de perdas com cartões de crédito e débito.

Pesquisa, implicações práticas e sociais: Espera-se que os dashboards sejam cruciais para armazenar e exibir os dados recolhidos sobre os meios de pagamento, permitindo uma melhor visualização dos mesmos e apoiando a tomada de decisões, além de serem fáceis de manusear e aplicar no dia-a-dia.

Originalidade/valor: Verificou-se que a ferramenta dashboard está em uso crescente, devido a sua alta versatilidade, aplicabilidade, capacidade e competência em entregar o que se propõe, a visualização de dados.

Palavras-chave: Inteligência de Negócios, Dashboard, Google Sheets, Google Data Studio, Meio de Pagamento.

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ANÁLISIS DE MÉTODOS DE PAGO PARA DISTRIBUIDOR DE CAMELOS UTILIZANDO HERRAMIENTAS DE BI

RESUMEN

Propósito: El presente trabajo tiene como objetivo analizar los medios de pago de una distribuidora de golosinas con el fin de ofrecer un Sistema de Apoyo a la Decisión.

Marco teórico: En el mundo actual, la necesidad de diferenciarse y reducir los desperdicios por parte de las empresas en el mercado es cada vez mayor. Así, han surgido nuevas formas de ayudar a las empresas en esta misión, como las herramientas para la toma de decisiones.

Diseño/metodología/enfoque: La metodología utilizada fue de carácter exploratorio, y las formas de abordaje abarcaron tanto lo cualitativo como lo cuantitativo.

Resultados: Como resultado final se logró obtener un tablero en el que se evalúan y comparan todas las formas de pago, mostrando además los índices de siniestralidad con tarjetas de crédito y débito.

Investigación, implicaciones prácticas y sociales: Se espera que los tableros sean cruciales para almacenar y mostrar los datos recopilados sobre los medios de pago, permitiendo una mejor visualización de estos y apoyando la toma de decisiones, además de ser fáciles de manejar y aplicar en el día a día.

Originalidad/valor: Se vio que la herramienta de tablero está en uso creciente, debido a su alta versatilidad, aplicabilidad, capacidad y competencia en la entrega de lo que propone, la visualización de datos.

Palabras clave: Inteligencia de Negocios, Dashboard, Google Sheets, Google Data Studio, Medio de Pago.

INTRODUCTION

Currently, companies are looking for mechanisms to stand out and gain a competitive advantage in the marketplace. Thus, technology is a relevant means by which companies resort to acquiring or developing different techniques to improve their methods, measures, and management. Thus, according to Dedonatto et al. (2006), they become capable of making more timely and strategic decisions, allowing for greater growth in corporate business.

According to Kamal, Rizki, and Aulia (2023), consumer needs more security aspect in mobile banking transaction but tends to use the digital wallet as their transaction preference due to the promotions and life-service application integrated. As a premium account for a digital wallet existed, the consumer tends to demand more on facilities and access to a maximum limit of balance on a digital wallet.

Currently, as an example of mechanisms, mobile payment acceptance has a high link with expected effort, trustworthiness, and performance, demonstrating that these factors impact adoption. Because the majority of people consider a rapid and dependable mobile payment system to be essential (Ebubedike et al., 2022).

Bahia, Idan, and Athab (2023) conducted a study, that it is an attempt to draw attention to the necessity of adopting the quality function deployment as a philosophy of quality assurance and reinforcing it as a part of the organization's culture for the sake of the improvement and supporting the competitive aspect.

In view of this, one of the processes that have been used by organizations is Business Intelligence, which consists of an instrument with the capacity to extract, organize, and analyze

a considerable volume of information, allowing managers to visualize important points for decisions in a quick and easy way (Dedonatto et al., 2006).

In this respect, some family businesses suffer from difficulties in storing and processing this data. It is at this point that an information system can benefit these institutions to make more profitable decisions through complete and intelligible reports.

Therefore, given the relevance of the subject, this article aims to, from the use of Business Intelligence tools, develop a dashboard with indicators related to payment methods in order to assist the decision-making process of a candy distributor located in the state of São Paulo.

Thus, knowing the payment methods used by customers, it will be possible to identify patterns and decide assertively in relation to the method used.

Therefore, the Business Intelligence system aims to strategically handle the data collected to assist in decision-making and allow businesses to remain in a market that has become increasingly competitive.

LITERATURE REVIEW

The next section addresses topics related to the literature review.

About Decision Support Systems

Decision-making processes have always existed throughout history. In ancient times, one way of making decisions was by consulting deities. This was considered the wisest way. However, when something did not turn out as intended, it was always attributed to some resentment or desire of the deity to make something happen that way. Thus, this custom was passed through history, from belief to belief, until the beginning of modernity (Bispo, 1998).

In the 20th century, decision-making changed drastically with industrialization. Initially, the decision-making was done by the "bosses", since the employees were seen as mere "labor" and unable to act assertively in moments that needed a decision. In the 60's a great revolution occurred in relation to this field with the beginning of the Human Relations School movement, together with Social Psychology. At that time, this movement began to see employees as "human resources", so it began to work with deeper and broader issues, such as motivation and skills, in order to make employees participate in the decision-making of companies and thus increase their profits (Bispo, 1998).

For Pereira and Fonseca (1997) the word decision is formed by the prefix "de" (Latin prefix here with the meaning of stop, extract, interrupt) that comes before the word "caedere"

(which means "to split, cut"). In other words, literally, a decision must be made whenever there is a problem that has one more alternative as a solution. Even if the problem has an alternative, we still have the decision to pursue it or not.

As for Ferreira (2006), the Decision Support System (DSS) is defined as an information system that combines poorly organized data models, seeking to organize and solve them. With this, to develop a DSS, it is necessary to make an action plan, system analysis, iterative development and, finally, implementation, respectively.

According to Bispo and Cezarini (1998), Information Technology, especially when it comes to SAD, has a fundamental role in companies solving problems in a more creative and faster way, thus gaining competitiveness in the market. This method started to be called Business Intelligence in the United States. Thus, the most important methods according to the authors are data warehouse, OLAP, and data mining, in the first moment.

The data warehouse is a database used in cases of managerial needs to help them make decisions related to their demands. OLAP (On-Line Analytical Processing) is a tool used to perform some types of analysis related to a business view. Finally, data mining is defined as a system that allows sophisticated searches with the help of artificial intelligence, thus discovering facts that can serve as a strategy for the business (Bispo & Cezarini, 1998). Over time other tools have emerged that can assist in decision-making, such as Business Intelligence, Google Sheets, Google Data Studio, among others.

About Business Intelligence and data processing tools (BI)

Business Intelligence is a term that appeared in the 80's, when companies needed to organize themselves a little more in order to get the necessary information faster. This process, which became known as BI, aims to collect, treat, and organize all the company's data so that, in this way, the results and information are delivered in the desired manner. All this information is treated in a single software, which can be, for example, Power BI, Google Sheets, or Google Data Studio (Pereira, 2020).

About Google Sheets

According to Neon (2020), Google Sheets or Google Spreadsheets are similar to an online version of Excel®. The tool is used to perform calculations, schedules, timelines, and dashboards, as well as for data processing and storage. In addition, it is possible to handle it online or offline, giving permission to other people to collaborate in real-time.

To use this tool you just need to have a Gmail account and internet access. After that, just search for "Google Sheets" on Google's website and log in with the registered user. After logging in, you can choose ready-made templates or start a blank project.

To perform data processing using this tool, the data must first be collected and arranged in the spreadsheet. After this, the "Data" feature is used for distribution into columns. It is important to remove columns that will not be used, as well as to make width adjustments. It is also possible to generate dynamic tables and automatic graphics that allow better visualization of the data.

Therefore, through the use of this tool, it will be possible to collect and manage such information, being this action relevant to the decision-making process. Considering that the use of spreadsheets for data analysis is part of everyday life in many companies, this tool will be used to collect and treat data from the candy distributor in the study in question.

About Google Data Studio

Google Data Studio is a tool belonging to Google and thus, it can be connected to applications belonging to the company. One of the applications where such a connection is possible is Google Sheets, which is mentioned in Pereira (2020). By obtaining a database it is possible to transfer it to Google Sheets in spreadsheet form and connect it to Google Data Studio for the creation of reports and dashboards with various functionalities according to the initial database. According to Pinto (2022), Data Studio has, among several features, the ability to perform calculations and treat data in the form of tables, column charts, and time series charts.

The reports and dashboards created in Google Data Studio have several uses for the work sectors, because, according to Junior (2021), this is a way to view a large database in a simplified and interactive way. With this, it is possible that decision-making is faster and more objective, because the user will not take time analyzing a large database in spreadsheet format. Data Studio can also be used to present reports to companies and customers because it has a simple, complete, and visual format of what happens in a database.

According to a tutorial provided by Google, you can see how to create a report in Data Studio. According to Google (2022), the first step to using the Google Data Studio tool is to log into the Google Data Studio platform. Then, to create a report in the tool, you need to click "Create and select the report". After this command, Data Studio will open the "Add data to report" page with two tabs: "Connect to data" and "My data source". So when choosing "Connect to data" you need to choose the data type, add your account, and click add. When you choose "My data source", you need to locate the data source and click add. You can also view

the items in this tutorial: Add another chart, customize the report style, add a banner, and add a title to the report.

On Data Analysis and Pattern Identification

Storing data at a low cost and the wide availability of the Internet have facilitated access to large amounts of data. The ease of access opens promising avenues towards the use of this data, leading to challenges such as converting this data into a format that can be used to improve decision-making, assisting in improving the governance and management of companies (Rud, 2009).

Business intelligence, business intelligence, business intelligence, Business Intelligence, or simply BI, are terms used, in general, to designate the strategy of collecting information from a company and analyzing it in a visual way, in order to assist decision-making based on data. This strategy has been increasingly used by organizations, which allocate more and more investments (Jourdan et al., 2008).

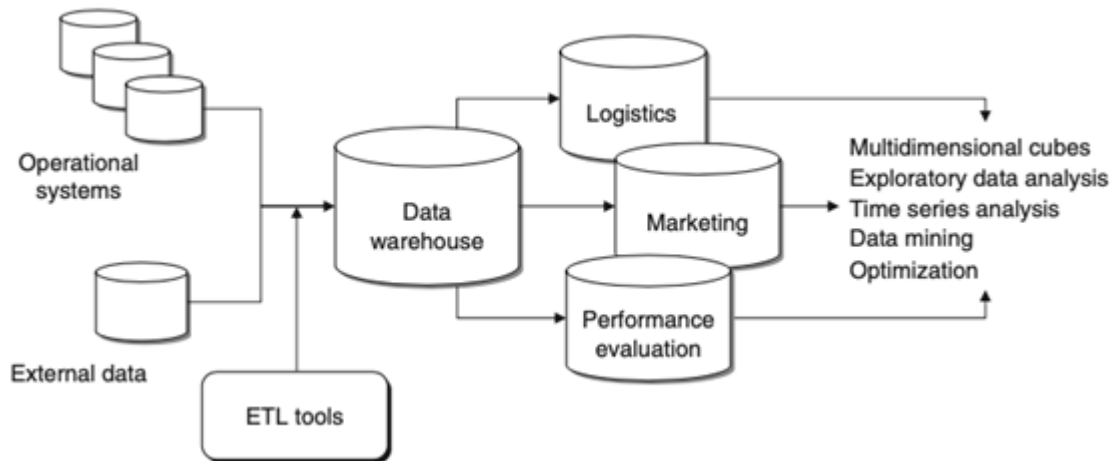
BI consists of a set of mathematical models and analytical methodologies that analyze available data to generate information and knowledge that support decision-making. Sometimes, this analysis is nothing more than a few calculations of totals and percentages, represented graphically through simple histograms. More complex analyses require more advanced optimization and learning models. However, they all share some factors such as (Vercellis, 2011).

Initial identification of the objectives of the analysis and definition of the performance indicators that make sense for evaluating alternative options;

1. development of mathematical models that explore the relationships between system control variables, parameters, and evaluation metrics;
2. Conducting hypothesis analyses to evaluate the effects on performance determined by variations in control variables and changes in parameters.

By the architecture of the BI process it is possible to perceive the step of data entry and definition of the operational system, data handling (and storage) and display according to data origin and analysis purpose (Vercellis, 2011) (Figure 1).

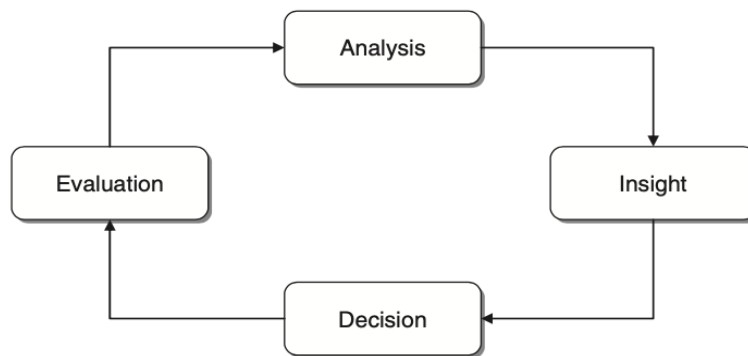
Figure 1 - Typical BI process structure



Source: Vercellis (2011)

Its analytical stage behaves like a cycle, in which the analysis will provide insights into the theme that facilitate decision-making. This, in turn, should be analyzed, returning to the cycle (Vercellis, 2011).

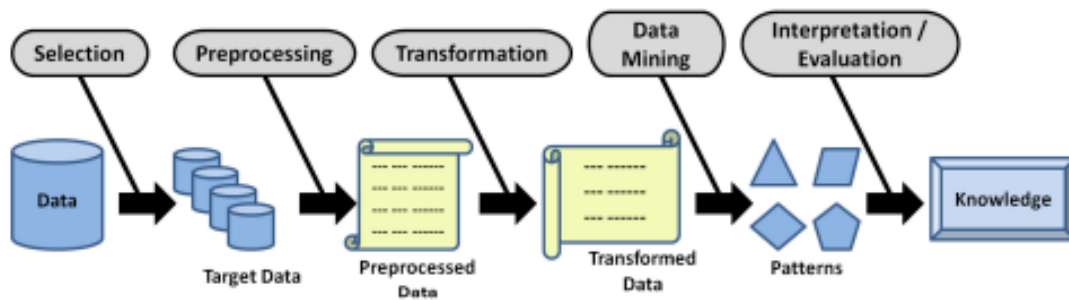
Figure 2 - Typical BI process structure



Source: Vercellis (2011)

Passing the analysis stage, we have the insight stage. In this stage, there is the occurrence of a phenomenon of extreme importance in any scientific study, the identification of patterns (Vercellis, 2011). This phenomenon is part of the Knowledge Discovery in Databases (KDD) process, which consists of identifying new, valid, potentially useful, and understandable patterns in the data (Fayyad et al., 1996a). KDD follows the following main steps (Gullo, 2015) (Figure 3).

Figure 3 - Representation of the Knowledge Discovery in Databases (KDD) process



Source: Gullo (2015)

1. Selection, which aims to create a subset of data that you want to investigate from the original data;
2. Preprocessing, which aims to "clean" the data through operations such as modeling and noise removal, treatment of missing information, and accounting for temporal information;
3. Transformation, which aims to reduce and project the data to obtain a suitable representation using transformation techniques or methods of invariant data representation;
4. Data mining, which aims to extract patterns by choosing (i) a specific data mining method or task (summarization, classification, clustering, regression, etc.), (ii) an algorithm, and (iii) an appropriate representation of the output results;
5. Interpretation/evaluation, which aims at the interpretation and extraction of the knowledge arising from the previous step. In this phase, the aim is to visualize patterns or models.

Data mining, when identifying patterns, is done through the analysis of a large amount of data collected, stored and originated from the most varied sources, such as the Web, e-commerce, purchases, transactions, etc. This data will then be classified, clustered and graphically represented in order to fulfill two of the central goals of data mining: to aid in data prediction and description (Fayyad et al., 1996b). Within the predictive objective, there is the construction of a predictive model of future behavior or values for certain features. On the other hand, within the descriptive function of data mining, the model aims at describing the data in an understandable, effective, and efficient manner. Ultimately, these tools will be applied to assist in decision-making.

Brazilians' Means of Payment

This step seeks to bring up the main means of payments used by Brazilians to obtain goods or services, the reasons for their preferences, the influence of the Covid-19 pandemic, and the advantages of each type for businesses.

Credit

In Brazil, unlike in many other countries, there are different ways of paying for a purchased good or service. For the study, four main ones were chosen: credit, debit, Pix, and cash.

The one performed by credit card is issued by a financial institution and a payment institution and has a double function: (i) payment instrument; and (ii) post-paid credit instrument (Banco Central do Brasil, 2021). The second modality allows that every thirty day period, after its adhesion, the client can make the payment of an invoice, which will contain a list of all expenses made in the current period. It also has a maximum date for the compensation/payment/return of this granted credit to be made by the client.

The payment services linked to credit cards, including tariffs, are regulated and supervised by the Central Bank. The contract with the client is mandatory and must contain the rules and procedures of use.

Debit

The debit card works as a means of payment directly linked to the current or savings account. For this, it is important to pay attention to the existing balance, because unlike a credit card, payment via debit card is made exactly at the moment of purchase (BMG, 2020).

There are many advantages of using a debit card compared to physical cash or credit card. Among the main ones are:

1. Security: payment only works with a password. Even those with contactless technology, the password is required if the amount is high;
2. Convenience: It is not necessary to carry notes or coins around, the debit card acts like physical money, where the payment is made on the spot and debited directly from your current account;
3. Proof: In addition to the physical proof, each purchase made with a debit card is recorded in your current account statement.

The debit card also has some disadvantages, the main one being the lack of control that it can cause if you do not pay attention to the account balance. This can lead to problems of insufficient funds or even going into an overdraft.

Pix

Pix is a new means of payment that allows you to make transfers and payments instantly at any day and time. With it, you can both transfer money to other people and make payments to stores and service providers. With Pix, payments and transfers are completed within 10 seconds and can be made at any time and day, including weekends and holidays (Nubank, 2020).

It is worth mentioning that to send or receive a Pix, there is no need to register or download an application - it can be used directly on the application of the card institution; it is only necessary that it offers this means of payment (InfoMoney, 2022).

Money in kind

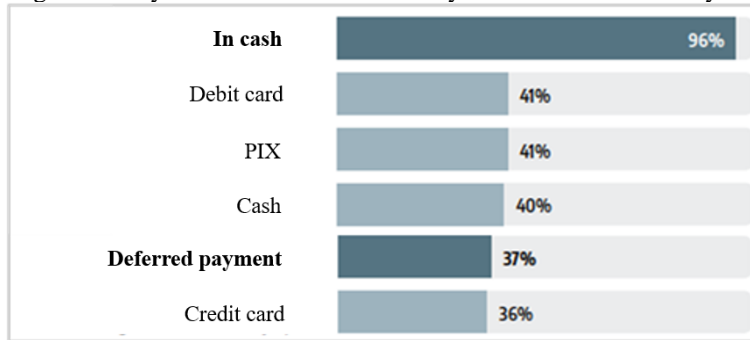
Cash is one of the oldest forms of payment in the world, it is money in its material form, not virtual, it is also known by several other names: physical money, banknote, ballot, and paper money. And when we talk about cash the term also includes metal coins (Banco24Horas, 2020).

By broadening the concept, cash also refers to the local currency of a particular country. Therefore foreign paper money is considered valid cash, however, it will depend on acceptance by merchants (which varies greatly). Usually, the cash money received is only that of the local currency. In Brazil, about 71% of the population uses this means of payment (Locomotiva – Pesquisa & Estratégia, 2019).

Reasons to make each type of payment

According to the study "Brazilians' Means of Payment" commissioned by SEBRAE (Brazilian Service of Support to Micro and Small Enterprises in Alagoas) in partnership with the CNDL System (National Confederation of Store Managers) in 2021, the payment methods most used by Brazilians (Figure 4), were: card (debit and credit), Pix and cash.

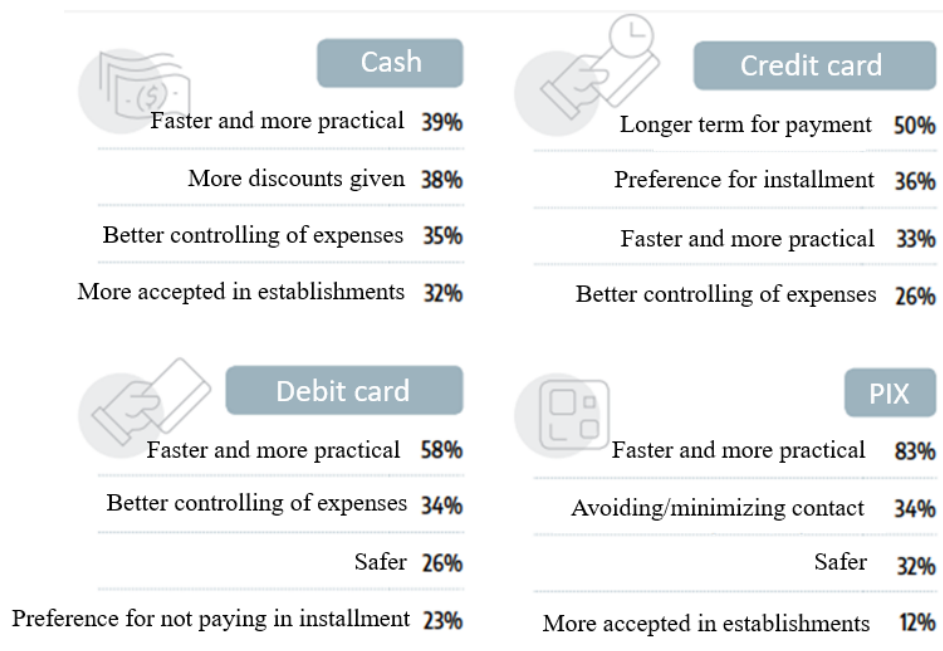
Figure 4 - Payment methods most used by Brazilians in their daily life



Source: Adapted from SEBRAE and CNDL (2021)

Also listed were the reasons (Figure 5), which lead the consumer to use each payment method.

Figure 5 - Reasons for choosing the preferred modality



Source: SEBRAE & CNDL (2021)

Influence of the COVID-19

When dealing with payment methods, the pandemic context could not be ignored. The health crisis imposed the need for social isolation and gave impetus to the adoption of payment methods that reduced the sharing of objects. Among the main motivations for the use of PIX, for example, is the desire to minimize physical contact.

Figure 6 - Changes in payment methods before and after the Pandemic of COVID-19

	TOTAL 2021	GENDER		AGE			CLASS		
		M	F	18 to 34	35 to 54	55 or more	A/B	C/D/E	
Yes (Total)	66,6%	63,3%	69,4%	72,0%	61,6%	64,9%	67,9%	66,3%	
Yes, I started making more payments online (whether by card, PIX or bank transfer)	44,6%	41,5%	47,3%	52,8%	41,0%	33,0%	50,0%	43,6%	
Yes, I started using my credit card more	22,7%	22,5%	22,9%	27,4%	18,0%	22,2%	25,2%	22,3%	
Yes, I started using cash more	4,8%	5,7%	4,1%	3,9%	4,3%	8,3%	0,8%	5,5%	
Yes, I started using my debit card more	20,6%	21,7%	19,7%	19,7%	21,9%	19,9%	12,2%	22,1%	
There was no change	33,4%	36,7%	30,6%	28,0%	38,4%	35,1%	32,1%	33,7%	
	Base:	800	349	451	317	332	151	128	672

Source: SEBRAE & CNDL (2021)

According to SEBRAE and CNDL (2021), about 67% of the survey respondents have had changes in the way they pay (Figure 6), because of the pandemic, mainly by going online, either by card, PIX or bank transfer (45%, especially among the younger ones).

Advantages to the company by type of payment

It is not possible to say that one form of payment is better than another. The company needs to evaluate the advantages and disadvantages of each, always considering the reality of the business and the profile of its customer. The advantages of the payment methods studied, according to Peregrino (2021), are:

1. Cash: the company has liquidity because it receives the money at the moment of sale; it does not pay a fee on each transaction charged on other means of payment; and it does not require complex registrations.
2. Credit and debit card: The modality is safe, since it prevents the company from having too much cash on hand.
3. PIX: besides having the same benefits as the previous modalities, this modality allows:
 - Optimization of the online checkout process;
 - Reduction of queues in face-to-face sales;
 - Generation of new business opportunities;
 - Serving different consumer groups, such as those who do not use credit cards;
 - Lower operating costs, compared to other solutions;
 - Improved customer experience, contributing to customer loyalty.

MATERIAL AND METHODOLOGY

The proposed research method was a case study of a retail and wholesale candy retailer in the city located in São Paulo State. It has an exploratory character and both a qualitative and quantitative approach (Gil, 1991). The qualitative information (Certo & Peter, 2010), was obtained mainly through interviews with the owners of the company. They were asked to list the main forms of payment they received on a daily basis.

Within the quantitative approach (Richardson, 1999), the information was obtained through the analysis of notebook records, transcribing them to Google Sheets, which pointed out the frequency of each form of payment. After that, Data Studio and Data Sheets were used to create panels, aiming at easy visualization for decision-making.

After identifying the desired information and transposing it to the online spreadsheet, a pre-analysis was made in order to verify the behavior and nature of the data. This done, considering the final objective of the decision support system, prototypes were developed aiming at the continuous improvement of the data visualization and of the user experience aspects. In this way, in the present topic the results referring to the development of the indicators panel, that is, the dashboard, will be presented.

It is noteworthy that the data refer to thirty-five distinct days, that is, a little over a month of sales records.

Database

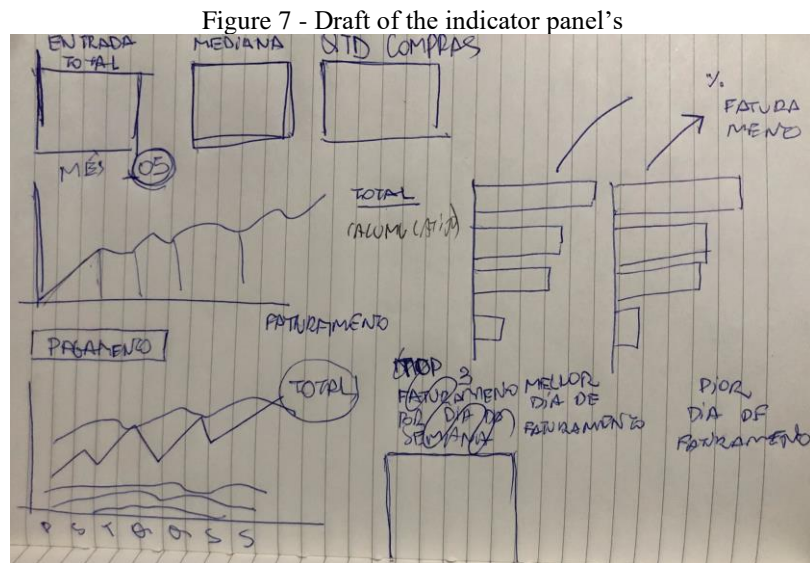
The database, initially, was composed of three different types of information, which were: the complete date of purchase, the payment method used, and the total amount paid in Reais. From this information, we generated other information that could eventually be interesting to present in the Dashboard, for example, day of the week of the purchase in full - Monday, Tuesday, Wednesday, among others - and week number in that respective month - first, second, third week of the month, among others.

With the database already consolidated, the dashboard prototyping was started.

Construction of the draft

A draft is understood as the initial outline of the dashboard, since it lacks information. Focusing only on what was intended to convey information through the dashboard, that is, the specific objective of the present Decision Support System, possible graphical visualizations that would best express the indicators of analysis were manually sketched. The process was repeated

until it was confirmed that the initial draft expressed the most elementary objects of the desired work. The following is one of the drafts made (Figure 7).



Once it was understood that the draft strategically and sufficiently represented the dashboard's purpose, development of the dashboard in Google Sheets and Google Data Studio began.

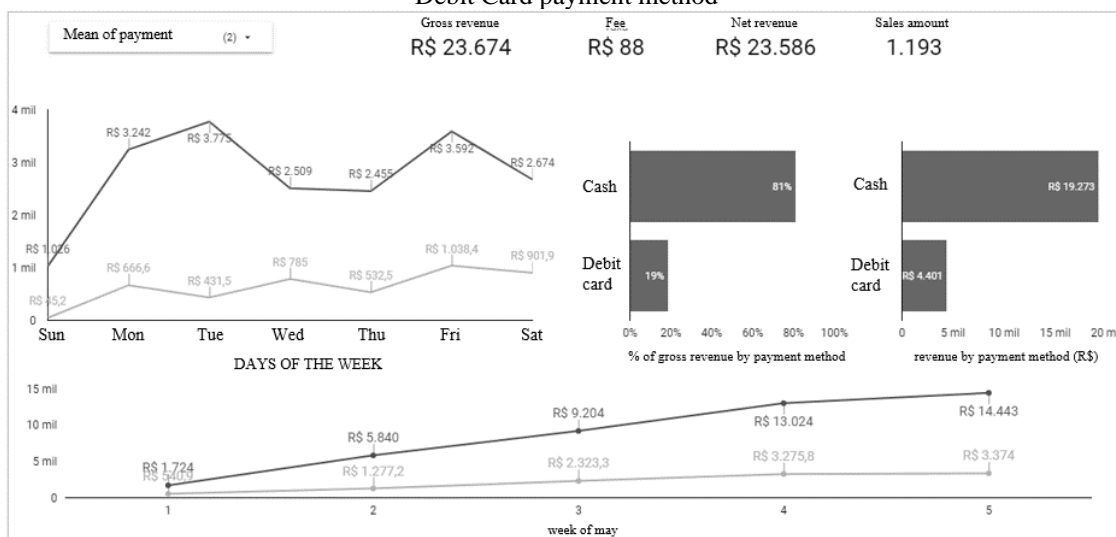
RESULTS AND DISCUSSION

The next section addresses the results and discussion obtained in the present study.

The Dashboard

For the sake of ease and practicality, the dashboard was initially built in Google Data Studio. This way, we obtained a kind of prototype closer to the final product. The following is a printout of the Google Data Studio screen (Figure 8).

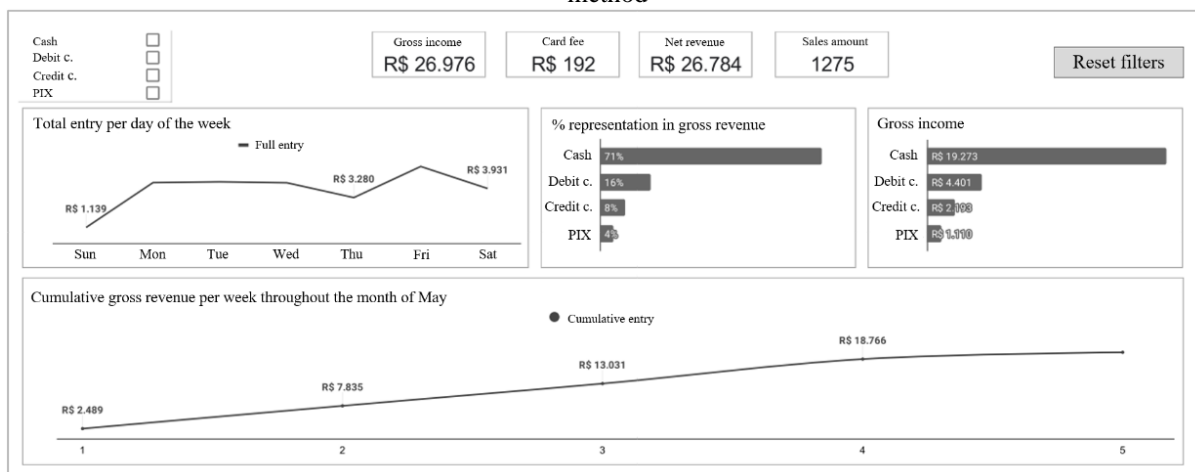
Figure 8 - Dashboard next to the final product in Google Data Studio - Filter: Comparison between Cash and Debit Card payment method



Source: Authors

Taking into account the unfamiliarity of the user with the tool and its inherent limitations, it was decided to proceed with the development of the Dashboard in Google Sheets, i.e., in Google's online spreadsheet. It is important to emphasize that the graphics, cards, and filters are exactly the same, so, the dashboard remained the same, with only the tool being changed. Thus, the following figure (Figure 9) shows the indicators dashboard created in Google Sheets.

Figure 9 - Final product in Google Data Studio - Filter: Comparison between Cash and Debit Card payment method



Source: Authors

That said, the following will be a description of the Dashboard components and what motivated their respective inclusions.

Filters

Seeking greater dynamism, flexibility, and productivity in the use of the indicator panel, a filter referring to the payment method was inserted. That is, the user can select one or more payment methods, being these, cash, credit card, debit card, and pix. Thus, once selected all graphics and cards on the dashboard change according to the user's choice.

The following is an example of when the user selects two payment methods - cash and debit card (Figure 10).

Figure 10 - Payment method filter: select cash and debit card

Cash	<input checked="" type="checkbox"/>
Credit card	<input type="checkbox"/>
Debit card	<input checked="" type="checkbox"/>
PIX	<input type="checkbox"/>

Source: Authors

It is worth pointing out that if no payment method is selected, the indicator panel will consider all methods, without any payment discrimination.

Cards

At the top of the dashboard, four cards have been added, so that each one expresses a relevant indicator for decision-making by the user. This visualization method was chosen because it provides sufficient highlighting of the key indicators in the panel. About this visualization form, it should be noted that the choice of the payment method filter interferes with the value to be expressed. Figure 11 below shows the four cards, without selecting a payment method.

Figure 11 - Indicator Cards - No payment filter selection



Source: Authors

Each card is composed of a title that expresses the meaning of the indicator and its value. In the following subtopics the titles of the cards will be briefly described.

GrossRevenue

The first card, from left to right, expresses the total revenue in Reais of the establishment in the recorded period. Thus saying, it is considered the sum of all sales, regardless of the form of payment, in the analyzed time interval.

CardRate

The second card, still from left to right, presents to the user how much of the gross revenue is taxed as a result of the use of credit and debit card payments.

The payment and banking companies, owners of the card machines, stipulate a fixed fee on each transaction made by credit and debit card, so a percentage of the value of all purchases, made according to these two forms of payment, will be returned to these organizations. In other words, this indicator expresses how much the candy distributor misses invoicing.

In this study, we adopted a percentage of 1.99% and 4.74% for debit and credit card transactions, respectively.

Netrevenue

Net revenue indicates how much the candy distributor actually invoices from sales. It is calculated by subtracting the gross revenue from the card fee. Thus, if you select payment methods other than credit and debit cards, the gross revenue will be numerically equal to the net revenue, since there will be no fee values.

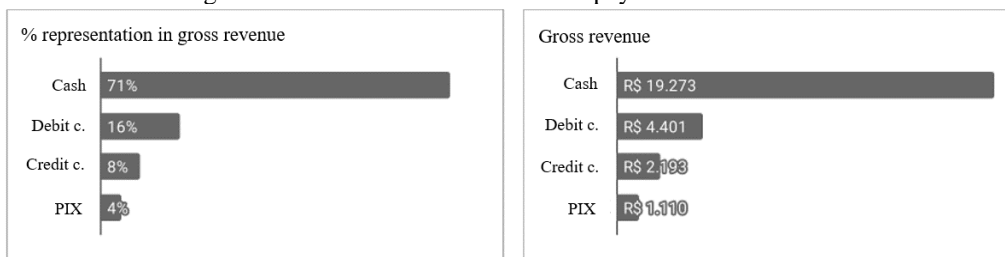
Quantity (Amount of) Sales

Finally, the quantity of sales indicator accounts for unique sales by payment method. Again, note that if payment methods are not selected as a filter, the total amount of sales will be expressed, regardless of the type of payment.

Horizontal bar graphs

In the dashboard presented, we used two horizontal bar graphs, the first displays the percentage of participation in sales by payment method, while the second reveals the total amount of sales in Reais per payment method. Figure 12 shows the two graphs side by side, as shown in the dashboard.

Figure 12 - Horizontal bar charts - No payment filter selection



Source: Authors

About the graphs present in the figure above, it holds forth.

% representativeness in gross revenue

Figure 12 shows that more than 70% of the candy distributor's revenues come from cash sales, approximately 24% from credit or debit cards, and only 4% from pix.

Thus, it is understood that cash represents the highest percentage of the candy distributor's revenue.

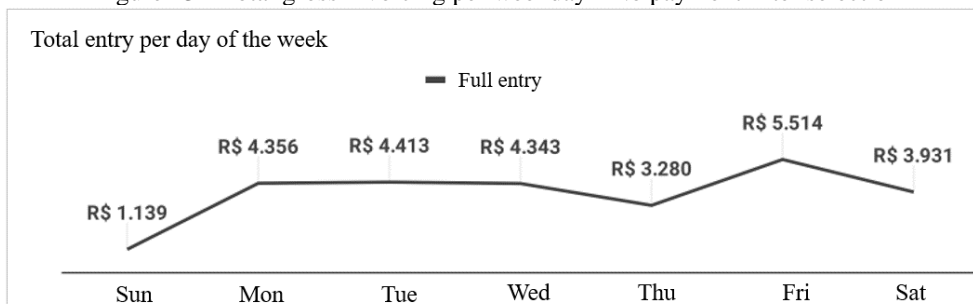
Gross revenue (R\$)

Figure 12 shows how much gross revenue, in Reais, was obtained through each form of payment. It appears that during the analyzed period, the gross revenue from cash payments was R\$ 19,273, from credit or debit cards R\$ 6,594, and from pix R\$ 1,110.

Timeline graphs

The timeline graphs present in the Dashboard were inserted with the intention of providing the user with a perception of the indicator's variation over time. Specifically, there is a chart that expresses the total gross revenue per day of the week and another that presents the accumulated revenue per week for the month of May. In Figures 13 and 14, we have the timeline graphs referred to.

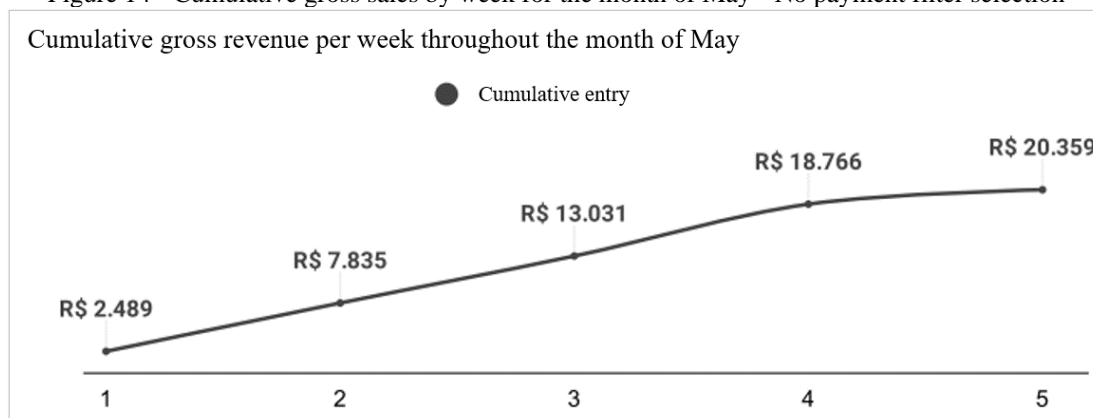
Figure 13 - Total gross invoicing per weekday - No payment filter selection



Source: Authors

It is understood that over the available period of data, Friday represents the day of the week when there was the highest gross sales, equivalent to R\$5,514, while Sunday was the lowest, with a value of R\$1,139.

Figure 14 - Cumulative gross sales by week for the month of May - No payment filter selection



Source: Authors

From the graph above, focusing only on the slope of the graph, it can be seen that the growth rate of gross revenue was practically constant throughout the month. At the end of the fifth week, a drop is observed, which is due to the fact that the last week of May has only three days - Sunday, Monday, and Tuesday.

For the purpose of exemplifying the usability of the dashboard by the user, the following are the timeline graphs considering credit and debit cards as payment filters.

Total Entry per Weekday (R\$)

Considering only the sales concluded by credit or debit card payment, select the desired options in the filter, obtaining Figure 15.

Figure 15 - Filter: Credit and Debit Card

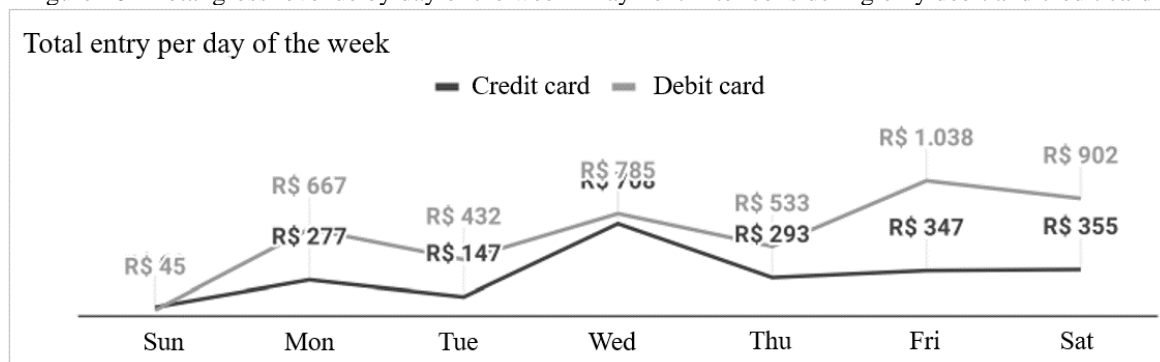
Cash	<input type="checkbox"/>
Credit card	<input checked="" type="checkbox"/>
Debit card	<input checked="" type="checkbox"/>
PIX	<input type="checkbox"/>

Source: Authors

This is done, all graphs and indicator cards in the dashboard will be adjusted according to the payment method. However, the behavior change in the timeline graphs stands out, since it becomes possible to compare the means of payment through the lines that represent them. For the purposes of effective comparison, it is suggested that comparisons be made of two payment methods at a time, thus avoiding unnecessary overlapping of data and, especially, excessive information, which hinders decision-making.

Thus, we can see below the total gross revenue per day of the week according to the payment method chosen. For better visualization, Figure 16.

Figure 16 - Total gross revenue by day of the week - Payment filter considering only debit and credit card



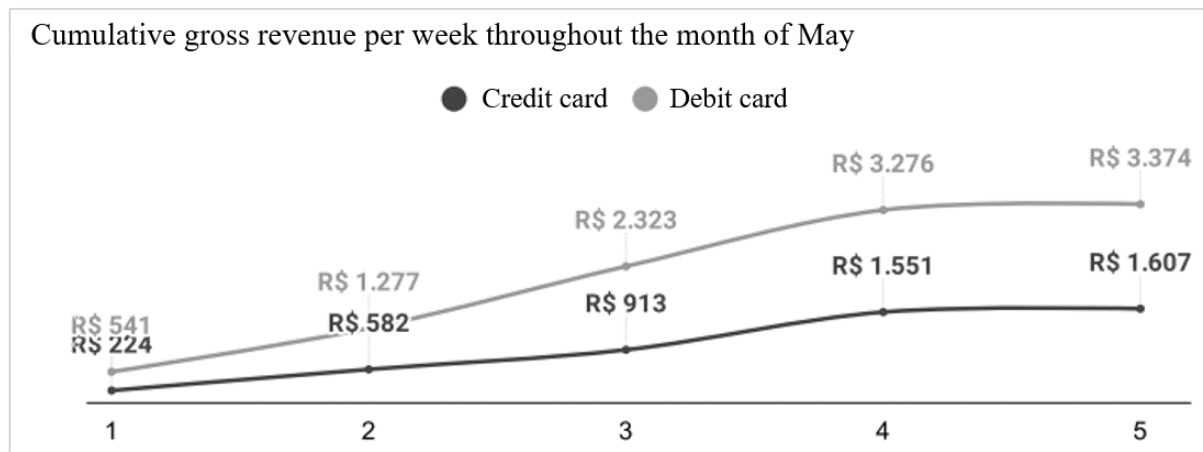
Source: Authors

It can be observed that the total gross revenue from sales made by debit card was higher than those made by credit card, paying attention to the days of the week. Thus, it can be seen that Sunday is the day in which billing through both payment methods almost equaled - smaller difference - while Friday represents the day in which there was the greatest discrepancy between the amounts invoiced. In both payment methods, a trend is perceived throughout the week, however, Wednesday stands out, since it presents a peak in the value of credit card sales, so that there was a considerable approximation between the value invoiced by credit and debit payments.

Cumulative gross revenue by week during the month of May

Still considering the payments made by credit and debit cards as filters in the dashboard, we generate a chart that contains the accumulated gross revenue per week in the month of May, discriminating each form of payment. Thus obtaining the following Figure 17.

Figure 17 - Cumulative gross invoicing by week for the month of May - Payment filter considering only debit and credit card



Source: Authors

We notice almost constant sales growth throughout the month, except in the fifth week. It is understood that because there are only three days in the last week of May - Sunday, Monday, and Tuesday - there is a reduction in the growth rate. That said, it is observed that each week the difference between the invoicing of both forms of payment increased almost linearly, and finally stabilized in the last week. In the first week, the difference was R\$317, while in the second to last week it was R\$1,725, and finally, in the last week, it was R\$1,767.

The graphics, cards, and filters allow the user to make analyses that are more in line with reality. Thus providing an improvement in decision-making, since it is based on empirical data and information. The dashboard must have a specific objective and must be built for a specific type of user, i.e., it must contain the key indicators and display them in the best possible way, taking into account all aspects of usability and user experience with the tool.

CONCLUSION

The present work was developed focusing on delivering a dashboard that would display information pertinent to the client's business, and at the same time convey this information in a simple, clear, visual and functional way. By completing it and making it available to the customer, the dashboard could become a powerful analysis tool, better grounding their decision-making.

It was seen that this tool is in increasing use, due to its high versatility, applicability, capacity, and competence in delivering what it proposes, the visualization of data. This is a significant indicator of the group's probability of success in choosing this tool for the client's solution development process.

Just as the impact of the application of these tools in the Business Intelligence field is noted, in the financial area, another revolution takes place: the arrival of PIX. This "novelty" has brought changes not only for merchants, like our client but also in the consumption behavior of customers in general. This moment of change is indicative of the need and the opportunity to develop studies like this one. And, specifically for our clients, it will be an opportunity to learn and always maintain the organization of their data, identifying possible new trends.

Thus, it is expected that these dashboards will be crucial to store and display the data collected about the payment methods, allowing better visualization of these and supporting the decision-making in your business, besides being easy to handle and apply on a daily basis.

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