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**The Impact of Business Intelligence and
Analytic tools in Business Performance -
*The Acembex Case Study***

GONÇALO GERALDES COELHO DIAS COSTA

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**The Impact of Business Intelligence
and Analytic tools in Business
Performance -
*The Acembex Case Study***

Final Work in Academic or Organizational Context
presented to Universidade Católica Portuguesa
in order to obtain the master's degree in Management

by

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Abstract

The aim of this Master's Final Assessment (MFA) is to describe how the challenges proposed by Acembex were addressed and overcome, regarding the implementation of Business Intelligence and Analytics (BI&A) tools in the company's Treasury and Commercial Departments. Thus, the main goal of the internship was to analyse the tools used daily by employees and determine whether they could be improved or replaced by others with better performance.

As such, the present MFA focuses on investigating the impact of BI&A tools on the company's performance, by analysing the situation before the introduction of analytical tools and compare it with the performance of the company after introducing such instruments. At the same time, this analysis is complemented with a pre-classification of the company according to the criteria of Davenport (2018) on the degree of analytics implementation, to later allow the observation of the evolution according to this scale. This study is intended to evaluate the improvement that such tools can introduce in a company and what benefits, in quantitative terms, can come from it.

Acembex does not have a strong analytical component; therefore, at an early stage of the internship, the objective was to structure, clean, work and standardize the collected data, to later extract information from it. This was accomplished with the aid of Descriptive Analytics tools such as dashboards and through optimisation techniques namely heuristic models. Far along, the main goal was to introduce these tools within the company's daily decision-making process.

As the study of the impact of the tools provided by BI&A on Small and Medium-sized Enterprises (SME) is not very extensive, this analysis is of extreme interest, considering that, in Portugal, this type of companies constitute the biggest percentage of Portuguese businesses.

Consequently, and as the final purpose of this investigation, the analysis culminates in an assessment of the impact of analytical tools on the company's performance, and whether they came to streamline its way of operating and attempt to quantify this evolution.

Keywords: Business Intelligence, Business Analytics, Acembex case study, VBA, Power Query, Excel

Resumo

O objetivo deste Trabalho Final de Mestrado (TFM) passa por descrever como os desafios propostos pela Acembex foram abordados e solucionados no que diz respeito à implementação de ferramentas de Business Intelligence e Analytics (BI&A) no Departamento de Tesouraria e no Departamento Comercial. Desta forma, o estágio focou-se na análise das ferramentas utilizadas diariamente pelos colaboradores, determinando se as mesmas poderiam ser melhoradas ou substituídas por outras com melhor desempenho.

Assim, o presente TFM tem como foco investigar o impacto das ferramentas de BI&A no desempenho da empresa, analisando a situação antes da introdução de ferramentas analíticas para, posteriormente, compará-la com a performance da mesma após a introdução de ditos instrumentos. Ao mesmo tempo, esta análise é complementada com uma pré-classificação da empresa de acordo com os critérios de Davenport (2018) sobre o grau de adoção de ferramentas analíticas, para, subsequentemente, permitir a observação da evolução de acordo com a mesma. Este estudo pretende, assim, avaliar a melhoria que tais ferramentas podem trazer para a empresa e quais os benefícios, em termos quantitativos.

A Acembex não tem uma forte componente analítica, portanto, numa fase inicial do estágio, o objetivo passou por estruturar, limpar, trabalhar e uniformizar os dados recolhidos para, de seguida, extrair informações dos mesmos. Tal foi realizado com o auxílio de ferramentas de Análise Descritiva, tais como dashboards, e também de através de ferramentas de otimização, nomeadamente modelos heurísticos. O propósito deste estágio passou por introduzir estas ferramentas no processo de tomada de decisão da empresa.

Atendendo a que o estudo do impacto das ferramentas disponibilizadas pelo BI&A nas Pequenas e Médias Empresas (PME) não é muito extenso, esta análise é de extremo interesse, visto que, em Portugal, este tipo de empresas constitui uma grande parte do tecido empresarial português.

Consequentemente, e como conclusão desta investigação, a análise culmina numa avaliação do impacto das ferramentas analíticas no desempenho da empresa, se estas vieram agilizar a sua forma de operar e tentar quantificar essa evolução.

Palavras-chave: Business Intelligence, Business Analytics, Caso de estudo da Acembex, VBA, Power Query, Excel

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Chapter 1

Introduction

The current context in the business world is characterised by aggressive competition, fleeting globalisation, unceasing political changes, rapid growth, and technological advances. To survive in this relentlessly changing environment, companies try to acquire the best set of tools that give them a competitive advantage (N'Cho, 2017). BI&A appears in this context as a solution for obtaining new knowledge, creating value, and establishing competitive advantages.

Nowadays, BI&A is a revolution that is difficult to pass unnoticed (Acito and Khatri, 2014), being referred to by many as the new oil (Bublies, 2000). This process involves making the best use of the value of the databases a company has. Such extraction of value from data implies an alignment between the company's strategy and the desired behaviors for a good performance, together with the needed analytical tools. Companies that focus on good performance make decisions strongly based on rigorous analysis of the decision environment and, therefore, the correct collection, processing and presentation of information has a great impact on their performance.

For example, Chen et al. (2012) suggest that BI&A and related technologies can help companies *“to better understand their business and market”* whereas Sharma et al. (2014) propose that companies can *“leverage opportunities presented by the use of abundant data and analytic tools specifically tailored for the business model”*.

In order to provide quality information, BI&A must stand on rigorous research and analysis of the company, seeking to understand its entire value chain, including the resource allocation processes, so as to understand where the sources of added value are to better apply these instruments. Thusly, organisations, before embarking on a search for analytical tools which is often done at a high cost, must understand the analytical environment in which they operate (Sivarajah et al., 2017).

The most visible improvement brought about by these instruments is greater agility in the decision-making process, leading later on to an improvement in the company's performance. This way, one can not only improve operational efficiency but also discover new sources of income and gain a competitive advantage.

Given the characteristics and surroundings of Acembex, it proved of interest to analyse the impact derived from introducing the above-mentioned analytical instruments. Having said that, in the first stage, the case study develops a diagnosis, through data analysis, of the company's situation before the implementation of BI&A tools, while seeking to understand its greatest needs for analytical tools.

Afterwards, the developed and implemented analytic tools will be described, analysed, and evaluated. In the commercial department, the constructed tools were mainly descriptive, such as dashboards, whereas in the financial and treasury department, the main focus was on prescriptive tools such as optimisation tools for decision making in management control.

To conclude, an evaluation of the implemented actions will be conducted, that is, a diagnosis of the situation after the implementation of these instruments and a comparison with the situation before said implementation, evaluating if there was, in fact, an improvement brought about by the application of the analytical tools.

Chapter 2

Introduction to Acembex

Acembex was created in 1970 to develop the sugar's kilogram package for R.A.R. - Sociedade de Controle (Holding), S.A. - and resulted from a joint venture between Tate & Lyle International (U.K.) and R.A.R. (Refinarias de Açúcar Reunidas, S.A.R.L.). In the early 1980s, Grupo RAR acquired 100% of Acembex's capital. First and foremost, their motto is to *“combine value creation with customer satisfaction”*.

Acembex is an international trading company, focused on providing logistics and advisory service. In this section, the company will be examined to provide insights on its context and means of operating.

2.1 Business Model

Given the fact that Acembex is positioned as one of the largest national cereal operators (wheat, corn, rice, barley) and other raw materials for the rations and food industries (moving through the ports of Mainland Portugal and Insular, around 900 thousand tons per year), and that in 2018 it had a turnover of 163 million euros, it is crucial to know how the company manages to achieve these results, to create a congruent background and enable working the data with consistency.



Figure 2.1: Acembex Business Flowchart

Acembex's value proposition is to "sell at the best market price guaranteeing product and customer service compliance" and, to that end, it seeks to find a set of purchasing and finance solutions with its customers, as well as logistical services appropriate to their needs.

The business model is based on a conservative, back-to-back policy, as it does not assume speculative positions within local markets for its suppliers. Its main activity is, therefore, the purchase and sale of raw materials and the provision of logistics services. It is the conservative and non-speculative policy that stands out from Acembex's business model and, consequently, the adopted method is to intertwine the process of buying and selling.

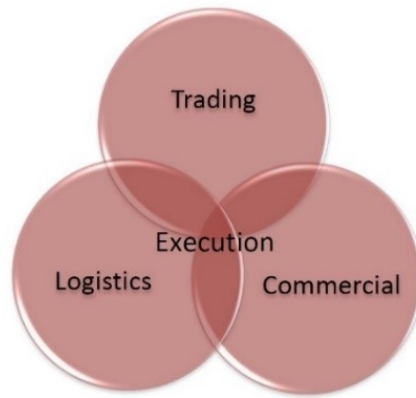


Figure 2.2: Acembex's Operations Division

The company's operations are divided into four main areas:

- The **Trading department (TD)** is involved in the process of acquiring cereal grains from international traders located in several markets. In most cases, it uses as benchmark the future commodities' listed price in NYSE Liffe (this international derivatives exchange market comprises the markets operated by Liffe Administration and Management, Euronext Amsterdam, Euronext Brussels, Euronext Lisbon, and Euronext Paris). To the cost of buying the cereal, a business surplus and other associated costs are added, based on the chosen method of sale. This description may be somewhat simplistic since the complexity in which Acembex operates can be quite a challenging task. The trader has to keep up with the information provided by Logistics and Commercial during each trading operation. During the same interval, time is a constant constraint since other competitors are trying to match the optimal bid to make a profitable operation. Seeing as Acembex keeps a tight policy on avoiding speculative moves, the Trading area only focuses on finding the present best solutions for its clients.
- The **Commercial Department (CD)** is responsible for matching the daily trading opportunities with customer's needs. Since knowing client's production levels, stocks and future demand is key for the correct flow of business, this operational area is of critical importance in the business model. The information gathered by this department provides the opportunity to look for market openings that may be suitable for clients and valuable for the Trading area.

- The **Logistics department (LD)** is in control of all processes that involve the load of cereal grains from their origin, the handling of the vessel’s availability for each cargo and the delivery of said cargo to its destination port. Hence, this department is the final piece of a complex puzzle being in charge of ensuring the correct “*modus operandi*”.
- The **Execution department (ED)** translates into action all the processes designed for each contract, and for this reason, it is at the helm of keeping track of all deliveries and matching all payables and receivables ensuring there is no potential issue with plafonds when accepting client’s orders.

In **Figure 2.3**, it is possible to observe the usual process of a sale or purchase. Whenever an opportunity is detected by either the TD or the CD, a benchmarking analysis is performed to assess whether the prices are adjusted to market prices. In essence, if either department spots an opportunity, the other immediately attempts to locate a possible buyer or supplier. For instance, if the opportunity was detected by the TD, the CD scours for possible customers for the transaction. Alternatively, if the opportunity was due to the CD efforts, the TD tries to find the supplier that better suits the operation.

Once price, suppliers and customers are defined, the LD and ED spring into action by reviewing and ensuring the necessary logistics and financial requirements for the operation. These include the conveying and harbouring of the cargo in the

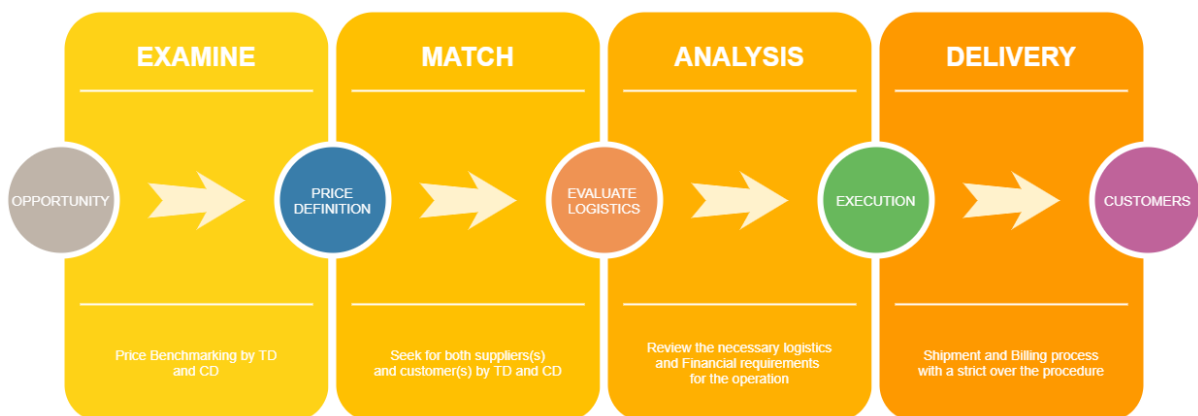


Figure 2.3: Acembex’s Sales Flowchart

destination and the fulfilment of the financial requisites such as *Confirming* and *Factoring* Operations. These financial instruments exist to aid companies in improving treasury management. *Confirming* is a contractual agreement between a bank and a company to provide a payment management service. As a result, this enables the service user to facilitate the paying process of his purchases with the financial institution advancing the payment of invoices to the user's suppliers. Analogously, *Factoring* is financial assistance in which a bank grants an amount to the service user until the due date of the user's debt. In other words, it translates into the acquisition of short-term debt by a financial institution resulting from the provision of services or sale of products. On both operations, in exchange for their services, the financial institutions apply a fee to the amounts being lent. Following the analysis by the LD and ED, the last step is the delivery of the product to the customer while ensuring, throughout the entire process, food security and quality control actions are performed following regulations.

The commitment between all departments enables a proper business flow and enhances performance. Particularly noteworthy is the responsibility borne by the commercial department considering they are responsible for simultaneously overseeing cargo loading operations in several countries and guaranteeing the correct handling of all required logistic operations. The complexity behind each trading operation, the country-of-origin legal exportation's requirements adding up to the seaport's legislation, demand for daily careful attention over each contract.

Internally, the credit risks, mainly the interest rate risk and credit-granting risk, are low considering that the level of bank indebtedness is moderate and credit-granting is controlled through policies of granted credit ceiling and that loans overdue for more than 90 days are recognized as a cost.

At the product level, its main business partners are European agricultural cooperatives, production multinationals and some brokers (intermediaries); in terms of services, their main partners are port operators, stockists, and oversight companies.

European agricultural cooperatives, akin multinationals that do not operate in Portugal and brokers for some of the products are its main suppliers for cereals, oilseeds, and by-products. For tailor-made products, the suppliers are producers of broken rice, barley, and wheat bran. However, the occasional domestic imbalances between supply and demand, as well as the competitiveness of other producing countries, require linking to other sources just as, for example, Egypt, Greece, Myanmar, and India.

As main distribution channels, it regularly uses sea transportation while land and train are alternatives seldomly resorted to.

As direct customers it has milling factories, rice whitening factories and compound feed factories; as distributors, the focus is on non-importing companies that allow them to increase their capillarity in the market and overcome the limitations of small customers. Hence, the majority of costs are: (1) logistic, (2) the product itself, (3) insurance and (4) financial, (5) securing revenue from product sales and (6) provided services.

2.2 Framework

In terms of market share, the company is the leading national player with a quota of 21% in 2019, being its main competitors, multinational counterparts such as Louis Dreyfus (with 20%) that ought to make a stand in the Iberian market with a specific strategy of implantation in the Portuguese market. These competitors may come as a consequence of Acembex's conservative policy, since this less aggressive but safer attitude may lead some of these suppliers to look for local alternatives. Moreover, additives and premixtures companies for animal feed with full integration strategies and customers with sufficient size for direct import may also pose a threat.

Additionally, price volatility and exchange rates can be a market risk. None-theless, this risk is neutralized or belittled by:

1. Simultaneous purchase and sale, with the stakeholders previously selected, of raw materials in the vast majority of transactions.
2. Transactions made under international contracts, namely Grain and Feed Trade Association (GAFTA) and Incograin.
3. Currency exposure coverage by offsetting credits granted and credits received expressed in the same currency.
4. When the above is not possible, other hedging instruments are used, mainly exchange rate forwards.

So, the company's main aptitudes are (a) international credibility and brand value; their (b) partnership-like relationship with customers; and (c) innovative solutions regarding supply chain services (custom-oriented solutions). Concurrently, its main weaknesses are the fact that the transacted raw materials are (I) commodities and therefore can be easily interchangeable; (II) relatively reduced dimension in comparison to multinationals that operate globally; (III) conservative and non-speculative policy, less competitive in periods of continuous price rise; and (IV) limited dimension of the national market (matured market).

Acembex's activity may also suffer from external factors, such as Genetically Modified Organism (GMO) legislation that prevents some corn trades or milk quotas from entering Europe, which may decrease the production of compound foods and result in the direct replacement by customers with sufficient volume to make their shipping a viable solution. Although, since this is not the customers' core business, they prefer to pass the financial and logistic risk to Acembex.




2.3 Strategies, accomplishments and operating mode

Acembex's headquarters are located in Porto and, with only 15 employees, it achieved a turnover of 163 million euros, in 2018. This accomplishment was, in large part, due to its business model that ensures product's "*Quality and Security*", while developing, in partnership with some customers and suppliers, control, tracking and traceability actions, throughout the raw material supply flow, seeking to guarantee a rigorous quality of the final product.




Prior to 2008, management cycle control was done based on historical data and the forecasting had little to no support. Nowadays, Grupo RAR's planning process is always focused on the future. Thus, a **strategic and financial plan** with a top-down perspective for the following three years is done annually alongside the **annual plan** with a bottom-up perspective. What's more, there is a constant **control on business performance** and an **annual evaluation** of the yearly performance.

The **strategic and financial plan** results from the reflection of top management on the path and company's positioning for the future. This reflection is framed within the group's strategy, culminating in the formulation of strategies, policies and objectives that have the medium term as their time horizon.

The **annual plan** starts with the proposal of commercial objectives (trading, commercial and logistics) for the operational area for the next year, followed by negotiation, if necessary, between management control and the commercial area to align operational objectives with the company's strategy. This plan reflects a set of scheduled and funded actions to be implemented - following and within the scope of strategic planning - these being:

-  Operational inputs up to the level of contribution;
-  Allocation of structural costs to the business areas;
-  Usage of activity levels and Human Resources (HR) involvement as a criterion which includes measures just as Key Performance Indicators (KPIs) of relevance to sales, Earnings Before Interests, Taxes, Depreciation and Amortization (EBITDA) and Economic Profit (EP) management.

Business performance control guarantees the sharing of business evolution, through the publication of items of revenue, costs, and investments for all areas of the company within agreed timeframes, being:

-  Monthly - Management Maps;
-  Bimonthly - Management Maps and Activity Monitoring Reports;
-  Quarterly – Profit and Loss (P&L) and presentation of the business evolution among the top managers of the Group companies.

The **annual evaluation** of business performance is carried on all employees, in January of every year, to promote, encourage, and maximize their performance. It also allows alignment with management and strategic objectives. It is done through self-evaluation and 180^o evaluation according to previously defined individual objectives.

Planning and conception of operations also need a strategic framework and not only purchase and sell perspective. As a result, simultaneously, there can be two suppliers with different prices and financing conditions and, owing to pre-defined strategic decisions, the best solution may be the supplier with higher pricing conditions.

Fundamentally, Acembex's main financial goal is the shareholder's return and, to that end, the commercial team pitches in by cultivating existing relationships with customers (increasing sale in volume and diversity) and seeking new customer relationships whilst striving for a greater margin and maintaining customer satisfaction.

Chapter 3

BI&A and Contextualization

Nowadays, the interaction between both several external and internal information systems exist in every technological environment, making the business environment, a large space where vast amounts of information are added every minute or even second. This creates a huge challenge for organisations that intend to harness information out of these massive amounts of data and to do so they must deploy the correct set of tools in motion.

In this context, BI&A, Data Mining, Machine Learning and Statistical Analysis are becoming more prevalent in organisations interested in extracting information from their databases, to explain and predict data (Hassani and Gahnouchi, 2017).

In the following section, the concept of BI&A will be defined and contextualized within contemporary standards as well as parsed within Acembex's reality.

3.1 What is BI&A?

According to Llave (2017), BI&A can be defined as a “*set of methodologies, processes, architectures, and technologies that transform the raw data into meaningful and useful information which allows users to make informed business decisions with real-time data*”. Additionally, it was also characterised by Gibson et al. (2004) from Gartner Research, widely recognised as the father of BI, as “*a broad category of software and solutions for gathering, consolidating and analysing, and providing access to data in a way that let enterprise users make better business decisions*”.

The task of designing and maintaining the above-mentioned systems is, according to Kimball and Ross (2013), the job of a data scientist and it is their responsibility to marshal an organisation’s data and bring it to business users for their decision-making. Therefore, it is understandable that BI&A can be considered a set of tools that can leverage value from data.

As stated by Acito and Khatri (2014), the main problem is that, while data can be employed for purposes such as detecting new opportunities, identifying market niches, and developing new products and services, it is also notoriously amorphous and hard to extract value from. This is where BI&A comes in handy given the fact it is a process that transforms a chaotic mass of information into structured information, facilitating decision-making. According to these authors, analytic capabilities refer to a portfolio of analysis methods and tools which include tools that support traditional *ad hoc queries*, inferential statistics, predictive analytics, simulation, and optimisation, thus supporting descriptive, diagnostic, predictive, and prescriptive analytics.

According to Hočevár and Jaklič (2010), the typical procedures for constructing BI&A systems may include one or more of the following: (1) the identification of key performance indicators, (2) the setting up of the data warehouse, (3) the engineering and application of instruments and processes for data mining, (4) the use of On-Line Analytical Processing (frequently mentioned as OLAP), (5) the making of digital dashboards, and (6) reporting through data visualisation instruments. So,

most analytical tools include query tools, reporting tools, OLAP tools, data mining, control panels and advanced analytical solutions (e.g., What-if scenarios, optimisation, statistical analyses). Additionally, M. Olszak and Ziemba (2007) posit that to construct a sturdy BI&A system, the following components are required:

👉 *ETL tools*

👉 *Data warehouses*

👉 *OLAP tools*

👉 *Data mining tools*

👉 *Reporting and ad hoc inquiry tools*

👉 *Presentation layers*

As mentioned above, to build this system, data needs to be extracted from various internal sources, for example, Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) and external sources such as social media channels, clouds, Application Programming Interfaces (API), while using Extraction, Transformation and Load (ETL) tools. The data is then cleaned, standardized, transformed and loaded into a data warehouse or into a set of adapted data marts from where it is then made available to users and other analytical applications for query and analysis (Muriithi and Kotzé, 2013).

This leads to the main issue with traditional BI systems, which is the fact they are usually hosted in-house, and a considerable amount of human and financial resources are incurred to ensure its continued operation. Moreover, there is a vast set of existing techniques used by traditional BI&A tools when handling structured data, but these instruments proved to be insufficient with unstructured and semi-structured data. To handle this type of data, commonly referred to as “*Big Data*”, a whole new set of techniques are required (e.g., NoSQL tools).

BI&A deals with the acquisition, management and analysis of large amounts of data about business partners, products, services, customers and suppliers, activities, and transactions between them (Hočevar and Jaklič, 2010). Hence, as coined by Lönnqvist and Pirttimäki (2006), it is an *”organised and systematic process by which an organisation acquires, analyses and circulates information, from internal and external sources, which is relevant to its business activities and decision-making”*. It is a comprehensive concept, whereby an entire organisation is committed to using the available information systems effectively to obtain quality and timely information for decision-making, thereby creating competitive advantages. For this reason, BI&A is not only the instruments and the making of the system, but rather it is a broad concept that includes the appropriate orientation of the entire organisation, a new approach supported by senior management and extended throughout the organisation.

In short, and as proposed by Hočevar and Jaklič (2010), a BI&A system is usually not a single application but consists of different components closely related to each other, enabling users to select and analyse data, make aggregations and display the results in a form that is easy to use and understand. The architecture of such a system consists of:

- 🏢 Operational and external databases as data sources;
- 🏢 The *Extract, Transform, Load* process;
- 🏢 A *data warehouse*, which represents the central database for an entire company for storing and accessing data and is separated from operational systems;
- 🏢 *Tools for data access and analysis*, that translate the data into information.

According to Inmon (2002), data warehouses (DWH) *”provide decision-makers with a subject-oriented, integrated, non-volatile, time-variant collection of data”*. Both operational business and external sources are used to “feed” these systems, so usually, they contain large amounts of data. Ultimately, they aim to assist in the decision-making process hence they are organised in such a way to facilitate the use of this data.

In essence, DWHs provide the large-scale infrastructure for contemporary decision support. As a result, business intelligence results in a set of benefits to companies such as (1) faster and more accurate reporting; (2) an improved decision-making process; (3) improved customer satisfaction; (4) increased revenues; (5) savings in IT; and (6) savings in other areas (other than information technology).

3.2 Companies' analytical stage

As mentioned in the section above - section 3.1 - BI&A tools can leverage large data, improve the employment of analysis tools and support the application of advanced statistical methods to reveal new sources of value (Davenport, 2018). The author also delineated in his article four phases for the adoption of analytic tools in an organisation, which are:

- ☰ Analytics 1.0 - the era of unpolished descriptive analytics (or business intelligence), data management, and the advent of analysis and reporting tools. Characterised by small, structured, static data used mainly for internal decision making through descriptive analytics and human hypotheses, understood by Davenport as a phase where value is largely driven by goals of internal decision support rather than advanced predictive capabilities or granular statistical insights. Most analytical tasks are performed seemingly by back-office analysts, with high labour intensiveness and low speed of completion.
- ☰ Analytics 2.0 - the era of big data analytics, with big, unstructured, and fast-moving data, when powerful new data management platforms and innovation around information-based offerings leads to the emergence of data scientists in the organisation. The primary goal in this stage shifts from internal decision support to “data products” built around data and analytics for the use of data scientists. These products also alter from a static and unstructured format to an online and open-source format, steering the organisation to the use of visual analytics to support decision-making.

☰ Analytics 3.0 – this stage is marked by the need for longstanding companies to transform their business models and cultures with extensive use of analytics. Companies create data, both structured and unstructured, small and big, fast and slow-moving, while analytics-based products and analytical activities are increasingly industrialized often with thousands of machine-learning models and predictive and prescriptive tools. These tools and models are then used to corroborate both internal and external products and decision-making analytics becomes a core capability in the organisation.

☰ Analytics 4.0 – in this phase, analytics is now embedded and automated in the organisation and the developed and implemented tools are applied for augmentation rather than automation making use of cognitive technologies to automate robotic processes in digital tasks. It is the final step in the analytical sophistication featuring not only Artificial Intelligence (AI) but also a greater use of automation in the execution of a task, namely automated machine learning.

The author also states in another article (Davenport et al., 2001) that, without a strategic context, an organisation cannot decide what data to focus on or even what it is trying to achieve with an analytics initiative so, firstly, it was crucial to frame Acembex within Davenport’s classification criteria before deciding which tools would better fit their needs.

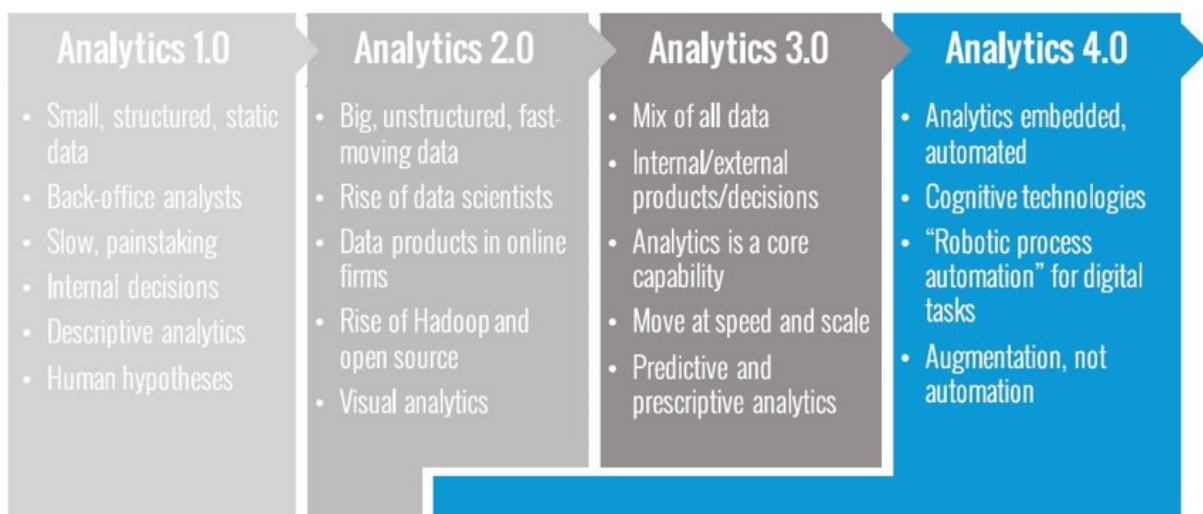


Figure 3.1: Evolution in BI&A adoption in an organisation in *“From Analytics to Artificial Intelligence”* by Thomas Davenport (2018)

3.3 BI&A in SMEs

As supported by Manyiaka et al. (2011) nowadays, the data that is continuously being collected enables us as a society to do things we could not do before: spot business trends, improve risk management, and enhance competitiveness, thereby creating value for the world economy. In an organisation, this data enables the analytically engaged participants to perform three tasks: produce intelligence, consume knowledge and enable the creation of insights (Chandler et al., 2011).

Every industry is without a doubt rich in data but harnessing and transforming it into usable information and relevant intelligence is the leading challenge in the BI&A industry. Realizing there is value in data is dependent upon multiple factors in each organisation such as culture, executive support, expertise, and funding. Therefore, initially, the competitive advantages that resulted from the use of BI&A in an organisation lied with those that had the expertise in how to implement new technologies but later on it shifted to those who knew how to use technology to improve business processes. Ultimately, it now lies with those who know how to use technology to share, manage and increase the level of knowledge.

As the majority of the BI&A systems are mainly adopted in large, multinational, and international enterprises, the research work on BI&A in SMEs is scarce which is a setback since SMEs make up around 90% of businesses and around 50% of employment worldwide (Llave, 2017) making it crucial to improve their global competitiveness. However, this type of company is typically vulnerable and frail and as result unable to withstand the onslaught of economic and global competition. To subsist, they must be able to monitor their business and use all their resources efficiently, especially information resources.

The objective of every information system (IS) is the same regardless of the type of data that is being collected and processed: primarily, the system must provide information to the user that has high quality, is accurate, timely and clear. These factors are important metrics for assessing the quality of the information and evaluate

the hiatus between two different information systems. The greater the effects of this difference are, the greater is the importance of access to quality information.

Moreover, according to Hočevar and Jaklič (2010), today's companies competitive advantage lies in the ability to convert masses of opaque data into useful information in the shortest possible time and one of the multiple technologies that allow managers to do this is BI&A.

In short, one can conclude that BI&A is not a new approach to the business world but rather, its true novelty is the ability to present business information in a fast, simple, and efficient way. This gives the means to users for understanding the logic and meaning of business information by employing a wide range of analytical possibilities and ad-hoc queries (Hočevar and Jaklič, 2010).

The SMEs' sector is characterised by a volatile environment, densely influenced by external pressures, and constantly expanding and transforming. Adding this to the fact that smaller businesses are more susceptible to economic uncertainty, it is clear that they are less tolerant of inefficiency. Particularly in times of global economic crisis, this vulnerability becomes apparent since most SMEs support large enterprises or provide speciality or outsourcing capabilities. This means that they also provide the backbone and structure for the global economy.

The literature on the benefits and challenges of implementing BI&A tools in large organisations is extensive. Regrettably, there have not been many analyses focusing solely on the study of these benefits and challenges on SMEs (Scholz et al., 2010), let alone a case study like the Acembex's case study that is explored in this work. In it, we regarded Acembex as an SME despite it not complying with all the requirements defined by the EU [(1) less than 250 employees and has (2) either an annual turnover lower than €50 million or an annual balance sheet total not exceeding €43 million as defined in the EU recommendation 2003/361¹].

¹<https://eur-lex.europa.eu/legal-content/PT/TXT/HTML/?uri=CELEX:32003H0361&from=EN>

For this case study, Acembex was considered an SME despite not filling the second criteria, given their turnover and annual balance sheet exceed the limit imposed by the European Commission. Such results are possible since the product it sells is a commodity acquired from suppliers, to which a transactional fee of usually around 1%, is applied. Furthermore, taking into consideration that their accounting is inserted in the RAR's group accounting and that if it were to be removed, Acembex may legally not be considered a large enterprise. Therefore, considering the second criteria as a decisive factor for classifying Acembex may lead to a categorisation mislead.

There are currently a large number of studies on BI&A success factors such as the one conducted by Hwang et al. (2004) that identifies factors in the dimensions of organisation, environment, and project planning. Nevertheless, these lines of research have a special focus on organisational factors rather than individual factors. For instance, these authors argue that the most critical factor is the support provided by top management. This becomes especially important since in SMEs the decision on IT related topics often falls on them. As such, the support given by top management in SMEs is not a question of whether the implementation will be successful but if there is general interest at all.

Existing investigations propose that SMEs, despite using other types of information systems, are limited in the adoption of BI systems (Levy and Powell, 1998). SME's main focus is on operational and administrative tasks, rather than strategic decision-making, and they tend to greatly emphasise the use of BI&A tools to automate, rather than inform, investing a large majority in software to help streamline business processes. This can come as a surprise to many since the use of quality information is a crucial factor in business performance of SMEs (Lybaert, 1998), which are usually evaluated through qualitative and quantitative measures. An explanation for this can be that small businesses tend to have a highly centralised management structure, with managers making the majority of critical decisions (Mintzberg, 1979). This suggests that any decision to adopt BI&A within the organisation largely depends on the individual characteristics and opinions of the manager(s). The individual characteristics of the manager(s) have a great impact on the business attitude towards the adoption

of BI&A solutions and the main reason is that they are the primary decision-makers within the company (Rizzoni, 1991). The main conclusion is that external forces, financial availability, and BI&A skills are not the only determinants adding to these the attitudes and opinions of the business' major decision-maker(s).

Another possible explanation might be related to the amount of capital required by this kind of project (Hwang et al., 2004), given that larger organisations are more prone to having vaster wealth to deplete on such projects. So, resource scarcity may also contribute to constraining SME's capability of employing specialised staff with adequate knowledge to implement BI solutions and may lead to the implementation of inferior solutions (Thong et al., 1996). On top of that, the lack of any specific strategic plan towards information systems and the fact that conventional BI&A systems may not be suitable to SMEs needs (since they are engineered for large organisations) further widens the gap between the two sectors resulting in a considerable disadvantage for small enterprises.

The studies of BI&A in SME's focus mainly either on identifying the most significant factors (Hwang et al., 2004), or on the extent of the adoption of these tools (Levy and Powell, 1998), or on the amount of capital that BI&A projects require (Hwang et al., 2004) or the lack of adjustment between IS and SME's needs (Bergeron, 2000) but never on a collection of all the above in the context of a case study to establish a connection between intending, planning, implementing and evaluating the adoption of BI&A tools in an SME.

Chapter 4

The application of BI&A tools in Acembex

According to Forrester Research (2010), BI&A is defined as *“a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision-making.”* and it deals with integrated approaches to management support. Therefore, all the devised technologies need to be in harmony with the company’s goals and the degree of BI&A engagement.

In this chapter, Acembex will be contextualised within Davenport’s classification criteria. Afterwards, an individual analysis will be conducted on all developed tools, bearing in mind not only the tools previously in use but also the challenges, solutions and benefits of applying the developed BI&A tools in Acembex.

4.1 Challenges encountered at Acembex

Before examining what systems were present in Acembex, it is important to first pinpoint the main obstacles that resulted from their degree of BI&A engagement and implemented processes. These were related with five different dimensions:

1. *Working tools used* – two main tools, which are SAP (Systems, Applications and Products) as an ERP software and Microsoft Excel as a spreadsheet tools for storing and analysing the data provided by SAP;
2. *Structure of the databases* – local server resembles a maze due to the number of similar files and folders. Most files are either only for daily, weekly, monthly, or yearly use or inside each file, there are multiple separated spreadsheets for each desired period (week, month, year);
3. *Degree of automation* – every operation either needs to be handled manually or requires constant human supervision;
4. *Cloud Computing adoption* – the company has subscribed the Microsoft 365 Business Basic which provides them with the opportunity to use Microsoft's cloud storage feature but it is not used;
5. *Usage of BI&A tools* – analytical reports are used to communicate results for RAR Holding and to support sporadic daily decisions.

A detailed analysis of the obstacles encountered in each of the above-mentioned dimensions was conducted. Therefore, regarding the used **working tools**, both software needs to be examined in detail to better understand their limitations. To begin with, SAP is a very powerful instrument to assist companies in managing several business areas, such as logistics, financial or human resources and is one the most advanced ERP systems available. The only dilemma this software brings is that it is divided into different subscription plans that grant access to different functionalities and Acembex has a subscription that does not allow third-party software connections.

Secondly, Acembex also has a Microsoft 365 Business Basic subscription which is recommended for companies that require a simple remote solution enabling access to the web versions of the Office tools and cloud storage. This subscription package has the online versions of Excel, Word, PowerPoint, OneNote, and Outlook with the latest updates for each tool and the possibility to use the mobile versions of each one. For a company that relies so much on the use of Excel, this subscription seems somewhat sparse given it only features the online versions of office tools. Nevertheless, every employee (in their company computer) has access to the computer versions of Office premium applications but the version in some of the computers dates back to Office 2007, thus being severely outdated. This means that most of the current features and capabilities that Microsoft has developed for the latest versions of these tools cannot be used. Furthermore, this subscription also allows cloud storage which is a property scarcely used because every file is stored in the local servers that can be accessed via VPN (Virtual Private Network). For example, one of the features that this system does not allow is real-time cocreation of the same file by multiple users, so every file can only be opened by one user at a time, making it a puzzling task to discover which user has which file opened or where it is opened.

As for the **structure of the implemented databases**, some concerns were also encountered both in the storage process and in the structure of the files. The first and main one was that Excel and SAP have no connectivity between them whatsoever. This means that every time new information is added to the ERP software, it needs to be manually extracted to Excel and stored within the company's servers. The result is that, with every "extraction", a new file is created with the new information that can then be added to the "historical data", turning the company's servers into a turmoil of files and folders with a different file for each different needed measure. A difficulty that arises from this is that every time a report is needed for the upper management, the data sources for the reporting and analysis tools have to be cleaned and structured from scratch further hindering the everyday job for the report developers. Additionally, within the same file, there can be several spreadsheets for different measures, such as date, making it a complex maze to navigate and find a specific required detail. For example, the same file can have a sheet for every month

in the year with information scattered across the multiple sheets and most of the times duplicated or missing. This happens because, at the end of the month (or year) the information needs to be transposed to the following sheet (or file) and in this process information can be lost or faultily transposed resulting in incorrect historical data, meaning that information is not unstructured but rather ill-structured.

Regarding automation, the procedures that involve the extraction of information from SAP and the addition or transformation of information in existing files have little to no **automation** making these tasks a painstaking process for workers thus regularly consuming a lot of their working hours. In addition to the misused time, all these manual tasks make room for possible errors namely when transposing information as previously mentioned or adding information without an error checking function.

For the **cloud computing adoption**, the main dilemma found was that the file-sharing system implemented in the company is based on a VPN server, severely lowering the capability of cocreation and file-sharing or accessing. Having a server that is only accessed through a VPN connection means that if for some reason, a worker needs to open a file from the server and does not have immediate access to a computer that has the company's VPN installed, he will not be able to do so. Moreover, access to the VPN is only granted through IT services. So, despite paying for the service of cloud storage, Acembex does not use such a service to its fullest potential.

Lastly, in respect of the **usage of BI&A tools** in the company, it can be stated that there are hardly any analysts in the organisation. Furthermore, reporting or analysis tools are seldom used and only used to report to the upper management. As such, every process is time-consuming and laborious and resorted to only to support the internal decisions and generate reports. Every time descriptive analytics are needed, given the system's limitations, they need to be developed from scratch. Current decision making does not rely on predictive or prescriptive tools for decision support. Furthermore, in its current state, there is no use of AI tools in the process of decision-making or to support everyday procedures. Hence, every analytical or

reporting process established or to be established focuses mainly on automation rather than information or augmentation. Historical data and gathered data for analytics are scattered throughout multiple files or folders which prevents such information from being used in prescriptive, predictive, or descriptive tools.

All in all, considering all the above-mentioned topics - in this section and section 3.2 - it is fair to say that Acembex is in the early stages of Analytics 1.0 according to Davenport's classification criteria.

4.2 Tools previously in use

One of the major challenges in developing new information tools for a company is the degree of engagement in BI&A that it already has. A business' basic knowledge or skills in computer usage may be a large hurdle to successfully adopt and use BI&A to support their decision-making processes. Alternatively, businesses that are competent in the use of information technology tools, given that they already have either an IT service or an IS in place within the organisation, are more likely to be comfortable with using BI&A and have less of a learning curve than others. Unfortunately, SME's employees are often ill-equipped in terms of information technology skills required to use BI&A as a tool to support decision-making.

Acembex is integrated into the RAR group, which already has an IT department (called Centrar), and their employees (both in Acembex and Centrar) are well equipped and informed about information systems already in place within the company. The only issue is that the currently used systems are limiting the potential that these employees have. As reasoned in the previous section – 3.2 – Acembex is in its early stages of BI&A development, meaning that it still has a lot of potential and room to grow. Therefore, the tools that were developed during the course of the internship always had in mind the restrictions of the ongoing tools.

Before analysing each tool in detail, it is crucial to distinguish the two departments for which these tools were developed - the treasury and commercial department positioned in the ED and CD, respectively. For the treasury department (TD) the goal was to come up with a new way to organize the files used daily that would require less maintenance and time to sustain. The commercial department needed a fresher and more organized look in their files as well as new information tools that enabled different insights on the available data.

While the TD had five different types of files which were comprised into two different types of files, the CD only had one file that was divided into two types of files for data structuring reasons.

Additionally, it is also essential to remind two other concepts - defined in section 2.1 - that are fundamental in this line of business, which are “*Confirming*” and “*Factoring*”. The first one occurs when a financial institution (Acembex resorts to six different banks) advances the payment of invoices to suppliers, before their due date. Thus, it ensures the continuity of the relationship between the customer and the supplier and it shortens their cash flow cycle. The latter translates into the acquisition of short-term credits by a financial institution (which in this case is Santander Totta Bank), resulting from the provision of services or sale of products. That is, it converts commercial credits from customers in debt, into immediate liquidity. Both financial operations are used to accelerate their cash flow since it releases them from the receivables or payables and thus renders them with the necessary working capital to continue trading.

An aspect also noteworthy is that from this point onward, **all images that derive from print screens from the company’s files have had their values altered for data protection reasons**. Thus, the goal is to illustrate the file’s arrangement rather than its actual content.

4.3 Tools developed and implemented

Having gathered the above information, all the developed tools were designed to overcome previous frailties and to automate every process as much as possible to minimize the possibility of errors in the data and to streamline their ways of operating.

Similar to the previous section – 4.2 – an analysis on the designed tools will be conducted in the following subsections, differentiating between each department and separate tools, so that every decision is justified and explained in detail since different tools were developed for each department and specific requirements.

Before all else, it is essential to enumerate the files that were previously in use within both departments. As such, the TD had five different types of files, for a total of around one hundred and seven files, which were:

- ☒ *“Mapa de Financiamento Semanal”* or Weekly Financing Map – with a total of ninety-one files just for 2020 and 2021;
- ☒ *“Planeamento de Tesouraria”* or Treasury Planning – with a total of one file
- ☒ *“Confirmings”* – with a total of seven files
- ☒ *“Necessidades de Atividade”* or Activity Needs – with a total of seven files
- ☒ *“Utilização Média Mensal de Confirmings”* or Average Monthly Usage of Confirmings – with a total of one file

The CD only had one type of file which was the *“Daily Sales”* that recorded all sales and purchases of goods with all the information regarding a specific contract. These were not only revamped but worked on to create new analysis tools. In addition to the *“Daily Sales”* revamped file, an annual file was created much like the *“Annual Treasury File”*. Similar to the previously mentioned files, data was scattered across

multiple files or sheets, having a file or sheet for every year, month, and week. This prevented an analysis of historical and a correct notion of sale’s evolution.

As such, for the TD the developed tools were the (1) Confirmings revamped file, the (2) Aggregated Treasury file and the (3) Annual Treasury file. Whereas for the CD, the tools created were (4) Daily Sales and (5) Annual Sales. The following subsections will analyse each file individually.

Department	Previous tools (No. of files)	New tools (No. of files)
Treasury	Confirmings file (7) Weekly Financing Map (91) Treasury Planning (1) Activity Needs (7) Average Monthly Usage of Confirmings (1)	Confirmings Revamped file (1) Aggregated Treasury file (1) Annual Treasury file file (1)
Commercial	Daily Sales (more than 100)	Daily Sales (1) Annual Sales (1)

Table 4.1: Previously used and developed tools

4.3.1 Confirmings revamped file

Considering the required work for the improvements, the previously used “*Confirmings*” files were the most complex to renovate, since they encompassed many variables and singularities. In them, all information regarding every transaction that was subject to a confirming contract is registered with as much detail as possible. Each file contained all information about the bank where the confirming was made, the supplier for which the transaction was requested, the dates for the request, beginning and end of the contract, the amount, the financial and operational expenses, the *Euribor*, spread and all-in interest rates as well as a specification of monthly expenses throughout the duration of the contract. In these documents, the most glaring susceptibility was that each month had a different sheet and each bank had its own “*table*”. As such, analysis of this data was impossible and every time a specific measurement was needed

Figure 4.1: Confirmings file layout

it was a time-consuming process to either compute it or to find it. Additionally, at the end of each month, active rows of data had to be copied from one month to the following, which gives rise to human error that can lead to incorrect balances and results. **Figure 4.1** shows how this file was previously organized, where each “table” shows the transactions for a single bank in a single month (in this case, September 2020). Another weak point in these files is that every year has a different file and as such it hinders the comparison of historical data.

Starting on the revamped “*Confirmings*” file, the first step taken was to aggregate the data from all available years that were scattered over several files and several sheets (since every year had a different file and every month a different sheet). The next step was cleaning and transforming data and, for that, all previous measurements were maintained while preserving its core structure, and every calculation was automated to avoid any human error. Regarding the novelties in this file, the main one is that it now only has two sheets: one for the historical data and another one for a few specific measurements.

In the historical datasheet, called “*Confirmings*”, all data was aggregated and there is now a single table containing all the available information, dating from 2015 to nowadays. The first modification made was to add an ID to each row to have an identifier to utilize in further procedures. Every supplier’s name and bank name were corrected to have standardized names for each and to avoid duplicates. The next step was to add an automatic calculation in every possible cell to avoid errors and

```

Public Function ifsfunction(CalculateCell As Range, _
    ColumnOffset As Long, _
    ColumnOffset1 As Long, _
    ColumnOffset2 As Long, _
    ColumnOffset3 As Long, _
    ColumnOffset4 As Long) As Double

    Dim sh As Worksheet
    Dim list As ListObject
    Dim xTtl As Double
    Dim xCell As Range
    Dim fatura As Double
    Dim spread As Double
    Dim eur As Double
    Dim dias As Integer

    Application.Volatile
    Set sh = ThisWorkbook.Sheets("Confirmings")
    For Each xCell In CalculateCell
        fatura = xCell.Offset(, ColumnOffset1).Value
        spread = xCell.Offset(, ColumnOffset2).Value
        eur = xCell.Offset(, ColumnOffset3).Value
        dias = xCell.Offset(, ColumnOffset4).Value
        If xCell.Offset(, ColumnOffset).Value = "NB" Then
            xTtl = fatura * (spread + eur) * (dias / 360)
        ElseIf xCell.Offset(, ColumnOffset).Value = "Novo Banco" Then
            xTtl = fatura * (spread + eur) * (dias / 360)
        ElseIf xCell.Offset(, ColumnOffset).Value = "BCP" Then
            xTtl = fatura * (spread + eur) * (dias / 360) * 1.04
        ElseIf xCell.Offset(, ColumnOffset).Value = "CGP" Then
            xTtl = fatura * (spread + eur) * (dias / 360)
        ElseIf xCell.Offset(, ColumnOffset).Value = "BFI" Then
            xTtl = fatura * (spread + eur) * (dias / 360) * 1.04
        ElseIf xCell.Offset(, ColumnOffset).Value = "BIC" Then
            xTtl = fatura * (spread + eur) * (dias / 360) * 1.04
        End If
    Next
    ifsfunction = xTtl
End Function

```

Figure 4.2: VBA code for the *IFS () Function*

to accelerate the process of entering data which means that when entering a new contract, all cells will be calculated automatically except for the ones where values are needed, e.g. contract amount, *Euribor* or interest rate. A major challenge in this part of the project was to find Excel formulas and features that would be capable of performing the required operations while simultaneously being compatible with the Office version of Acembex’s computers (Office 2010 or previous).

Each bank has a different formula for calculating the financial charges of a contract, and so it was required the usage of an *IFS () function*. This created the first main obstacle, given that this function was not available in the office version of the company’s computers and as such, a VBA (*Visual Basic Applications*) function was created to perform similarly, as demonstrated in **Figure 4.2**.

This “*ifsfunction*” uses a logical test that, while resorting to a “*CalculateCell*” as a reference, executes a loop until a condition is met, which is matching the name of the bank for the contract by using the “*ColumnOffset*” value with its formula for calculating the financial charges. Additional information is needed in this formula, such as contract amount (“*ColumnOffset1*”) and duration (“*ColumnOffset4*”), spread (“*ColumnOffset2*”) and Euribor (“*ColumnOffset3*”). These parameters work in the same way as the built-in *OFFSET () function*. While the “*ifsfunction*” - Annex A - was used to calculate the contract’s financial charges, an “*ifsfunction2*” was coded to calculate the contract’s operational charges.

	A	B	C	D	E	F	G	H
1	Banco	Spread	Euribor	Comissões	Plafon	Utilizado	Disponível	
2	Novo Banco	1,875%	0,000%	0,050%	4 300 000,00 €	€ -	€ 4 300 000,00	
3	BCP	1,000%	0,000%	0,050%	11 700 000,00 €	€ 8 883 988,35	€ 2 816 011,65	
4	BIC	1,250%	0,000%	0,050%	2 000 000,00 €	€ 802 734,08	€ 1 197 265,92	
5	CGD	1,150%	0,000%	4,000%	27 000 000,00 €	€ 22 819 833,34	€ 4 180 166,66	
6	BPI	1,100%	0,000%	0,033%	25 000 000,00 €	€ 19 318 253,04	€ 5 681 746,96	
7	DB	1,500%	-0,194%	€ 35,00	16 500 000,00 €	€ 11 190 666,29	€ 5 309 333,71	

Manter os Spreads, Euribor e Comissões atualizados em cada banco para a ferramenta poder calcular corretamente

Figure 4.3: "Inserir Confirmings" sheet layout

At the end of the table, a "Status" column was added to identify whether the contract is active or not, to allow Excel to calculate the usage of each bank's credit limit.

The other sheet, called "Inserir Confirming", presented in **Figure 4.3**, has a simple layout and it is where the main tool in this file was introduced - the "ActiveX Controls". These are two separate buttons, which are the "Adicionar / Calcular" and the "Atualizar / Eliminar" buttons, and each open a specific *UserForm*.

In the first few rows, there is a simple table (called "Spreads") where the spreads, *Euribor*, Fees and the credit limits for each bank are inserted. The last column is the available amount in each bank which is calculated considering the used amount. This amount is computed in the previous column which is based on a *SUMIFS () function*. It is in this calculation that the "Status" column came of use because it only adds the amounts that are active and that match to the respective bank.

The first button ("Adicionar / Calcular") is used to add new rows to the "Confirmings" sheet or to calculate the financial charges a contract will bear. Upon pressing on it, a new window will pop up as shown in **Figure 4.4** and the first noticeable thing are the two separate frames. This window is an *UserForm* that was designed in the *Visual Basic Editor*.

Figure 4.4: "Novo Confirming" Userform

On the left side of **Figure 4.4**, on the "Calcular Confirming" frame, users can resort to the optimisation tool that weighs the financial charges for each bank in a list and only returns the lowest one. Such a tool was created since, when choosing a bank in which to do a contract, the TD managers rely on their experience and perform a few calculations to ascertain which might be the optimal bank for the operation. The difficulty and inefficiency here is that, to assess the optimal bank, upper management has to either expend a lot of time in performing all the needed calculations or trust their expertise. For this reason, to assist their decision-making process, an optimisation tool was formulated that whenever the amount and duration of a contract are inserted, it returns the bank with the lowest payable interests for the contract. With a simple click, it executes all the calculations that, when done manually, consume large amounts of time. Hence, the goal with this improvement is to optimize each individual choice and, therefore, optimize all contracts as a whole.

This tool supports its calculations on the spreads, *Euribor* and fees that are present on the "Spreads" table which means that, for it to perform correctly, this table needs to be updated with the latest values for each of the rates, otherwise it may return the wrong "best" bank. An optimisation tool is also a useful tool for a company like Acembex since its main goal is shareholder's return and this instrument allows the company to perform more efficiently when initiating the process of issuing a new contract. Initially, the optimisation tool was intended to be a *Solver* model that would "run" every time a user pressed the "Calcular" button but while associating

the solver model with an *UserForm* button, it would lose one of its constraints making it obsolete. Despite many attempts to prevail over this error, an explanation was never found and, thus, the devised solution was a VBA macro that performs similar to a solver model and that “runs” every time the users press the “*Calcular*” button.

Having as a reference the provided Annex B that contains the VBA code for the user form called “*NovoConf*”, the first 129 lines of code refer to the proposed optimisation tool. When the user enters the amount (*Montante*), supplier (*Fornecedor*) and the beginning and end of the contract (*Data de início* and *Data de pagamento*, respectively) in the *UserForm* and then presses the button to calculate, the VBA code starts by computing the difference between the amount that is available in each bank and the contract’s amount. For each bank it performs a loop that, if this difference is a positive value (meaning that the bank has enough credit limit), calculates the financial charges and stores them in a list; if the difference is a negative value it stores in the same list the total contract’s amount. The result is a list that contains the financial charges for each bank for the inserted amount that is then transformed into an array so that a “*WorksheetFunction*” can be carried out to locate the minimum value within this array. After these steps are completed, a message box will appear stating which is the “optimal bank” and the associated financial charges. The last lines of code are IF statements to access if the inserted information is in the correct form, e.g. if the contract’s amount is a numerical value.

Apart from the solver model malfunction, there was another major challenge in this step which was the date text boxes. Originally, they were intended to be an *ActiveX Control* that opened a calendar (named *DatePicker* in VBA), as shown in **Figure 4.5**, where the user only had to choose the desired date. This format was chosen to avoid any errors in entering data, e.g. inserting 20/09/20020 instead of 20/09/2020 and to ease the process of data insertion. The only issue was that this *ActiveX Control* had to be downloaded and added to the available controls on the standard Excel, which is a problem in a company that has a strict data protection policy and does not allow the download of any kind of software into the company’s computer

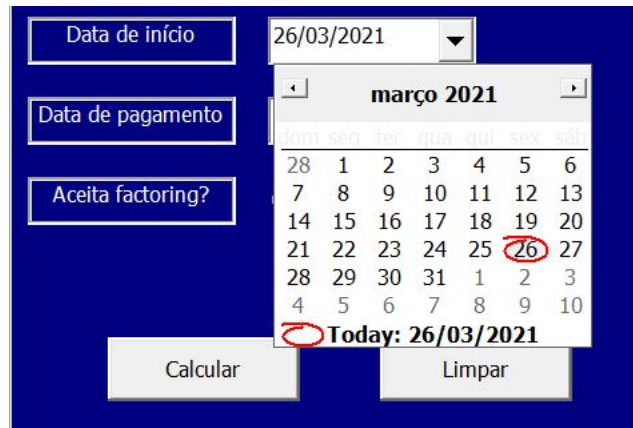


Figure 4.5: *Date Picker ActiveX Control*

(even if the software is from Microsoft, which is the case). The applied solution was to use a simple text box (as illustrated in **Figure 4.4**) formatted as a date which, as mentioned above, permits the inclusion of errors in the data.

On the right end side of **Figure 4.4**, the “*Adicionar Confirming*” frame, provides the user with the necessary text boxes to enter the contract’s additional information. After computing which is the optimal bank for the contract, the user can then select the bank in the first box, called *BancoBox*, which is a drop-down list of all the available banks. After having selected one of them, the boxes for the spread, Euribor and fees will be automatically filled in, resorting to a *VLOOKUP function* available in the “*WorksheetFunctions*”. Afterwards, the user can then select the “*Submeter*” button that adds all of the inserted information to a new row in the “*Confirmings*” sheet. This button also has a data validation procedure to avoid data errors like, for example, not allowing blank boxes.

Other than the already mentioned buttons, there also two more types of buttons in this *UserForm* which are the “*Limpar*” and the “*Sair*” button. The first one clears all entered data and resets all dates to the current day, while the latter simply closes the *UserForm* and therefore the window itself.

In addition to the functions above-mentioned, there are also important background functions to this *UserForm* that are vital for its correct functioning. These are the (1) *Confirming ID*, the (2) two loops that add the bank’s names and supplier’s

names to the drop-down lists, the (3) subprocedure for checking duplicates and the (4) code snippet that prints the entered values in the corresponding columns in the “*Confirmings*” table. The most important one is the subprocedure where the contract ID is generated. Every time the *UserForm* is initialized, all the entries in the first column of the “*Confirmings*” table will be counted and to that value, a unit will be added, so if there are already a thousand confirmings inserted in the file when opening the *UserForm*, an extra unit will be added to that one thousand counted rows so that the ID for the new contract be one thousand and one.

The “*Atualizar Confirming*”, shown in **Figure 4.6**, allows the user to update information related to a specific contract or to eliminate it. The *IDPedido* box is a drop-down list of the IDs from all contracts that were inserted in the “*Confirmings*” sheet and when an ID is selected all information regarding the contract is retrieved through an *Application.Match function* in VBA and then printed in the corresponding box. After having selected an ID, the user can either update or correct any information in the contract by using the “*Atualizar*” button or eliminate the row from the database which will eliminate the row from the “*Confirmings*” sheet by using the “*Apagar*” button. The “*Limpar*” button clears all values in the boxes and resets the dates to the current day while the “*Sair*” button exits the *UserForm* window.

Figure 4.6: “*Atualizar Confirming*” *Userform*

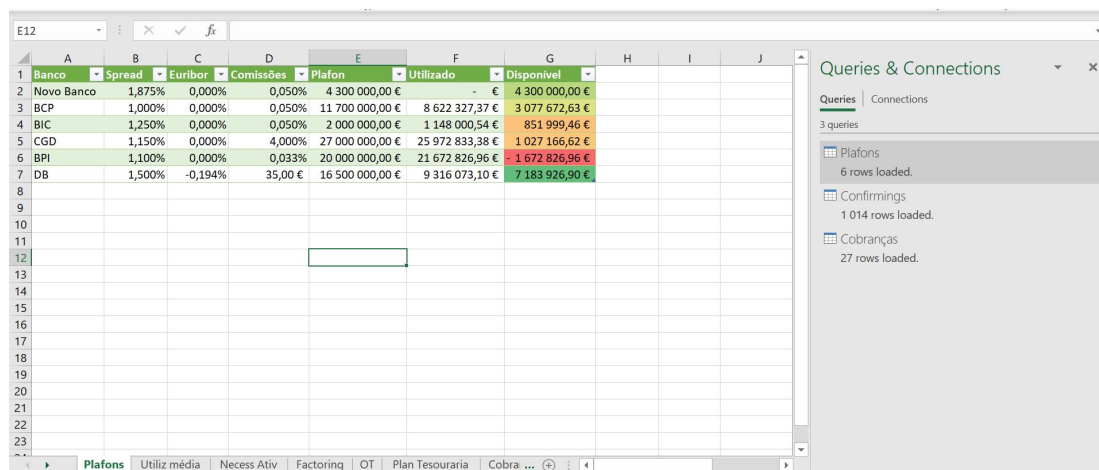
4.3.2 Aggregated Treasury file

The proposed file is a compilation of the “*Treasury Planning*”, “*Activity Needs*”, “*Weekly Financing Maps*” and “*Average Monthly Usage of Confirmings*”. It contains eight different sheets which are: “**Plafons**” (1), “**Confirmings**” (2), “**Cobranças**” (3), “**Utiliz media**” (4), “**Necess Ativ**” (5), “**Factoring**” (6), “**OT**” (7), “**Plan Tesouraria**” (8). The first three sheets are obtained through an OLE DB Query connection as shown in **Figure 4.7**.

Before analysing the proposed improvements, it is important to understand how the files were organized. As such, each will be scrutinized in the following section.

The previous and the devised “**Treasury Planning**” (8) files allow the financial director to have daily control on payables and receivables to analyse the current financial situation of the company and whether the available working capital is adequate to continue trading. The main weakness in the previous file was that data was not formatted as a table(s).

Both “**Activity Needs**” (5) file are a summary of the financial position of the company’s operations. They give the difference between payable financial investments and receivable financial investment since it has to forcibly be below 13 million euros, which is a limit imposed by RAR Holding. In the previous file, different months were



The screenshot displays an Excel spreadsheet with a table of financial data. The table has columns for Banco, Spread, Euribor, Comissões, Plafon, Utilizado, and Disponível. The data is as follows:

	Banco	Spread	Euribor	Comissões	Plafon	Utilizado	Disponível
2	Novo Banco	1,875%	0,000%	0,050%	4 300 000,00 €	-	4 300 000,00 €
3	BCP	1,000%	0,000%	0,050%	11 700 000,00 €	8 622 327,37 €	3 077 672,63 €
4	BIC	1,250%	0,000%	0,050%	2 000 000,00 €	1 148 000,54 €	851 999,46 €
5	CGD	1,150%	0,000%	4,000%	27 000 000,00 €	25 972 833,38 €	1 027 166,62 €
6	BPI	1,100%	0,000%	0,033%	20 000 000,00 €	21 672 826,96 €	- 1 672 826,96 €
7	DB	1,500%	-0,194%	35,00 €	16 500 000,00 €	9 316 073,10 €	7 183 926,90 €

On the right side of the screenshot, the 'Queries & Connections' pane is visible, showing three queries: 'Plafons' (6 rows loaded), 'Confirmings' (1 014 rows loaded), and 'Cobranças' (27 rows loaded).

Figure 4.7: Aggregated Treasury file layout and Power Query connections

on different sheets and different years were on different files, meaning that since data begins in 2014, there were at least eight files. Another susceptibility is that data is organized in columns rather than in rows which hinders the attempt of extracting value out of this data.

	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1				1,58%					1,62%						
2	Acumulado		Maio		Diário	Acumulado		Junho		Diário	Acumulado		Julho		Diário
3	2 559,11		01/05/2020	50 000 000	2 194,44	2 194,44		01/06/2020	50 000 000	2 245,60	2 245,60		01/07/2020	50 000 000	2 222,22
4	5 118,22		02/05/2020	50 000 000	2 194,44	4 388,89		02/06/2020	50 000 000	2 245,60	4 491,20		02/07/2020	50 000 000	2 222,22
5	7 682,89		03/05/2020	50 000 000	2 194,44	6 583,33		03/06/2020	50 000 000	2 245,60	6 736,79		03/07/2020	50 000 000	2 222,22
6	10 247,56		04/05/2020	50 000 000	2 194,44	8 777,78		04/06/2020	50 000 000	2 245,60	8 982,39		04/07/2020	50 000 000	2 222,22
7	12 812,22		05/05/2020	50 000 000	2 194,44	10 972,22		05/06/2020	50 000 000	2 245,60	11 227,99		05/07/2020	50 000 000	2 222,22
8	15 401,11		06/05/2020	50 000 000	2 194,44	13 166,67		06/06/2020	50 000 000	2 245,60	13 473,59		06/07/2020	50 000 000	2 222,22
9	18 052,00		07/05/2020	50 000 000	2 194,44	15 361,11		07/06/2020	50 000 000	2 245,60	15 719,18		07/07/2020	50 000 000	2 222,22
10	20 648,00		08/05/2020	50 000 000	2 194,44	17 555,56		08/06/2020	50 000 000	2 245,60	17 964,78		08/07/2020	50 000 000	2 222,22
11	23 179,11		09/05/2020	50 000 000	2 194,44	19 750,00		09/06/2020	50 000 000	2 245,60	20 210,38		09/07/2020	50 000 000	2 222,22
12	25 710,22		10/05/2020	50 000 000	2 194,44	21 944,44		10/06/2020	50 000 000	2 245,60	22 455,98		10/07/2020	50 000 000	2 222,22
13	28 241,33		11/05/2020	50 000 000	2 194,44	24 138,89		11/06/2020	50 000 000	2 245,60	24 701,57		11/07/2020	50 000 000	2 222,22
14	30 772,44		12/05/2020	50 000 000	2 194,44	26 333,33		12/06/2020	50 000 000	2 245,60	26 947,17		12/07/2020	50 000 000	2 222,22
15	33 318,00		13/05/2020	50 000 000	2 194,44	28 527,78		13/06/2020	50 000 000	2 245,60	29 192,77		13/07/2020	50 000 000	2 222,22
16	35 878,67		14/05/2020	50 000 000	2 194,44	30 722,22		14/06/2020	50 000 000	2 245,60	31 438,37		14/07/2020	50 000 000	2 222,22
17	38 458,44		15/05/2020	50 000 000	2 194,44	32 916,67		15/06/2020	50 000 000	2 245,60	33 683,96		15/07/2020	50 000 000	2 222,22
18	41 041,56		16/05/2020	50 000 000	2 194,44	35 111,11		16/06/2020	50 000 000	2 245,60	35 929,56		16/07/2020	50 000 000	2 222,22
19	43 616,89		17/05/2020	50 000 000	2 194,44	37 305,56		17/06/2020	50 000 000	2 245,60	38 175,16		17/07/2020	50 000 000	2 222,22
20	46 192,22		18/05/2020	50 000 000	2 194,44	39 500,00		18/06/2020	50 000 000	2 245,60	40 420,76		18/07/2020	50 000 000	2 222,22
21	48 767,56		19/05/2020	50 000 000	2 194,44	41 694,44		19/06/2020	50 000 000	2 245,60	42 666,36		19/07/2020	50 000 000	2 222,22
22	51 251,33		20/05/2020	50 000 000	2 194,44	43 888,89		20/06/2020	50 000 000	2 245,60	44 911,95		20/07/2020	50 000 000	2 222,22

Figure 4.8: Financial Investment file layout

The “Weekly Financing Maps” (6) and (7) document the daily “Factoring” and financial investments earnings. They are used to keep track of the available amounts and expected daily interest for “Factoring” and the returns that the financial investments are generating. Both Figure 4.8 and Figure 4.9 illustrate the layout of the previous file. The main frailty in this file was that data was not formatted as a table and in the “OT” sheet, different months were recorded in columns rather than in rows which did not facilitate or even allow a correct analysis of historical data.

Lastly, the “Average Monthly Usage of Confirmings” (4) file is a summing-up of the “Confirmings” files where every measure is an average of the monthly usage of each bank’s credit limit thus far. With it, the TD can keep tabs on the daily and monthly average usage to better understand trends and to aid in planning future confirming contracts. Unlike the previous files, all of the available years of data are gathered in this file, despite every month having a different sheet, meaning that there are over 85 different sheets so far, hampering the process of data analysis. Furthermore, much like the “Confirmings” files, at the end of each month, the balance of the last day of the previous month has to be copied to the following month.

	A	B	C	D	E	F	G
1							
2				Factoring			
3							
4			Total Plafond	10 000 000 €	14 400 000 €		
5							
6			Payment Date	Amount	Available		
555			31/12/2016	9 700 000,00 €	4 700 000,00 €		563,14
556			01/01/2017	9 500 000,00 €	4 900 000,00 €		551,53
557			02/01/2017	9 499 000,00 €	4 901 000,00 €		551,47
558			03/01/2017	9 498 000,00 €	4 902 000,00 €		551,41
559			04/01/2017	9 497 000,00 €	4 903 000,00 €		551,35
560			05/01/2017	9 496 000,00 €	4 904 000,00 €		551,30
561			06/01/2017	9 495 000,00 €	4 905 000,00 €		551,24
562			07/01/2017	9 494 000,00 €	4 906 000,00 €		551,18
563			08/01/2017	9 493 000,00 €	4 907 000,00 €		551,12
564			09/01/2017	9 492 000,00 €	4 908 000,00 €		551,06
565			10/01/2017	9 491 000,00 €	4 909 000,00 €		551,01
566			11/01/2017	9 490 000,00 €	4 910 000,00 €		550,95
567			12/01/2017	9 489 000,00 €	4 911 000,00 €		550,89
568			13/01/2017	9 488 000,00 €	4 912 000,00 €		550,83
569			14/01/2017	9 487 000,00 €	4 913 000,00 €		550,77
570			15/01/2017	9 486 000,00 €	4 914 000,00 €		550,72
571			16/01/2017	9 485 000,00 €	4 915 000,00 €		550,66

Figure 4.9: Factoring file layout

Regarding the work carried out to improve these files, to obtain the **”Plafons”** (1) and the **”Confirmings”** (2) sheets, to the *“Confirmings Revamped File”*, a series of simple OLE DB Query connections were executed through Power Query. With this type of connection, users can keep these two tables updated by just pressing the refresh button in the Data ribbon, instead of having to manually insert every single entry in all the files. This process was also chosen over the standard spreadsheet linking, where data from another workbook is pulled by using formulas, since in the chosen process it is possible to transform and adapt the data to match the destination file’s requirements through the necessary queries (a more detailed description of this choice is done in the following section - 4.3.3). After having all data regarding the confirmings contracts uploaded, it was then possible to aggregate all of the treasury files in this revamped file.

The first step was to create a table that behaved like the *“Average Monthly Usage of Confirmings”* file. By having the initially recorded balance dating back to 01/01/2016, to every subsequent day, if the name of the bank matched the bank on the contract and if the day when the contract began or ended matched the day being calculated (these values are fetched from the *“Confirmings”* sheet), the value of the contract was either added or subtracted to the ongoing balance. Hence, rather than having to manually insert data every day (or end of the month), everything is done automatically and devoid of human error.

```

(General) |AverVisible
Function AverVisible(Rg As Range)
    Dim xCell As Range
    Dim xCount As Integer
    Dim xTtl As Double

    Application.Volatile

    Set Rg = Intersect(Rg.Parent.UsedRange, Rg)

    For Each xCell In Rg
        If xCell.ColumnWidth > 0 _
            And xCell.RowHeight > 0 _
            And Not IsEmpty(xCell) _
            And IsNumeric(xCell.Value) Then
                xTtl = xTtl + xCell.Value
                xCount = xCount + 1
            End If
    Next

    If xCount > 0 Then
        AverVisible = xTtl / xCount
    Else
        AverVisible = 0
    End If
End Function

```

Figure 4.10: VBA code for the *"AverVisible"* function

In the original file, the last row of the above-mentioned table, was an average of the monthly usage and, to achieve this with the current format, a special function was also created. The *"AverVisible"* function acts just like a normal average function with the exception that, if the table is filtered (for example selecting only one month in the data) and, therefore, only part of the table is visible, it only averages the "visible" rows. This function can be dynamically applied to the whole dataset which means that, for example, if the whole table is visible it will average the entire available data. The VBA code for this function is demonstrated in **Figure 4.10**, where it is possible to verify that this function is a loop where if the cell's width and height are positive values (meaning that the cell is visible) and if it contains numeric information, its value will be added to $xTtl$ (a variable that stores the computed total) to be further divided by the count of the added cells.

Currently, this file's tables (like all others that will be examined) are dated until the end of 2021 which means that, every December, workers only have to manually add the following year to the table, and everything will perform as it should.

The *"Necessidades de Atividade"* sheet is a collection of data from the *"Utiliz media"* sheet and it gives the daily balance between payable financial investments and receivable financial investment to enable top managers to keep track of the firm's liquidity, hence its name or the shortened name for the sheet *"Necess Ativ"*. Again, initially, the *XLOOKUP ()* function was going to be used since it is a newer and

more dynamic version of the well-known *VLOOKUP () function*, but it was also not available in the company’s Office version. Here, instead of resorting to a VBA function, the *VLOOKUP () function* was used since it has the same result. In this table, the first two columns after the date column is where the value of the receivable (*OT*) and payables (*Factoring*) investments are manually inserted daily while the following six columns are average daily usage values that are fetched from the “*Utiliz media*” sheet. After these columns, the totals for the receivables and payables are automatically calculated to compute the daily balance. This table is of extreme importance since the holding company imposes a limit for the liquidity balance, thus requiring a careful and rigorous analysis by the company’s decision-makers.

After manually inserting the *OT* and *Factoring* values in the respective column, each value is separately loaded into the “*OT*” and “*Factoring*” sheet where a detailed analysis is conducted on each measure.

The two final sheets (“*Plan Tesouraria*” and “*Cobranças*”) are tables that were requested to be added to the current revamped file. We did not conduct any improvements to these two tables given the company’s lack of software compatibility. As such, these two tables require daily maintenance given their characteristics.

4.3.3 Annual Treasury file

This file is almost a copy of the aggregated file with the exception that it only contains values from the current year rather than the whole dataset. Every table in this file is connected through queries to the “*Aggregated Treasury File*” for a total of ten connections. This format proved to be far superior to a simple link between sheets or cells since it can work on large sets without abdicating memory capacity. Power Query can handle datasets with millions of rows while maintaining the file “light” and fast since it does not store the information in the destination file but rather it fetches the information from external data sources through an OLE DB Query connection. This type of connection returns the result of running the queries

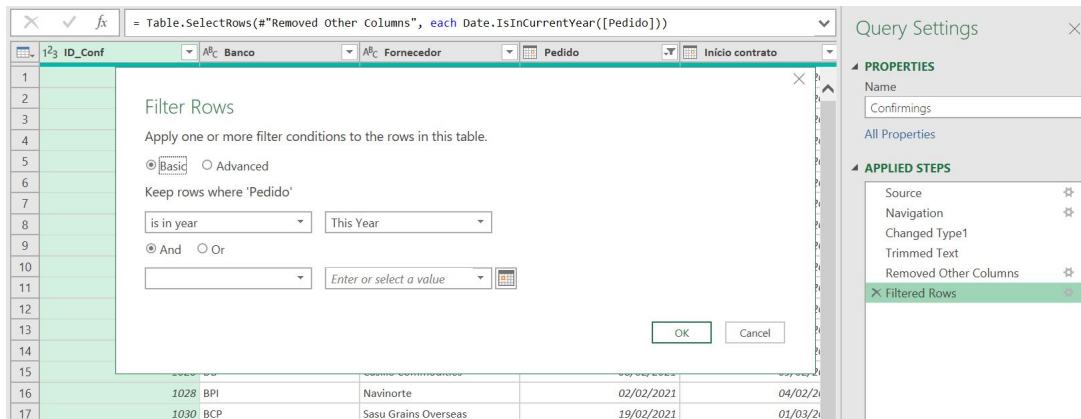




Figure 4.11: Date filter Query

associated with the connection string that is further stored as text or a record of property-value pairs (these can be either text or numbers). The common method for linking two files is writing the path for the external source on the desired cells' formula bar but this method stresses the computer's RAM and heavily slows the process of working on the workbook. OLE DB Query connections are much faster, lighter, and easy to work with hence the decision for this method. To the end of every query on this file, a date filter was added to only show the current year's data, making this file a simpler version of the aggregated file. This date filter query can be seen in **Figure 4.11**.



4.3.4 Daily Sales


Regarding the work done for the commercial department, the “*Daily Sales*” file was divided into eight different sheets, each with a different role, which, in order, are:

-  *Dashboard* (1)


 *Inserir_Venda* (2)

 *Vendas* (3)

 *Objetivos* (4)
-  *Dados_Prev_Entregas* (5)

 *Dados_Prev_Margem* (6)

 *Previsão_Margem* (7)

 *Previsão_Ent* (8)

Before analysing any of the other sheets, the central sheet in this file is “*Vendas*” which is a gathering of all the sales dating back to 2015. This data was attained by combining six different sheets in multiple files and then cleaning and transforming the data itself. This last step was perhaps the most important one in the whole process. As opposed to all files that were worked on and analysed until this far (where data was disorganized but did not require much cleaning and transforming), the previous “*Daily Sales*” needed cleaning, given it was not formatted in the most useful way. For example, each contract for a sale has a delivery timeframe, meaning it has an upper and lower limit for the expected delivery dates. This column was formatted in the “*yymm*” style, where if a delivery was expected to begin in September 2020, it was inserted in the contract as “*2009*”. The first problem with this format is that Excel (or any other analysis tool) interprets this value as the year 2009 rather than 09/2020. The second, and major problem, was that if a contract had a different date for the beginning and end of delivery, for every additional month of delivery time, an additional letter was added in alphabetical order in front of the last number. Furthermore, the beginning and end of the delivery time were placed within the same column and cell. To demonstrate this, if a contract was due to be delivered between September of 2020 and July of 2021, in the delivery column, the following was inserted: “*2009abcdefghij*”.

As such, the first step was to separate these dates into two different columns - one for the beginning and another for the end of the delivery - and to encounter a swifter way of correcting this column (in every single entry since 2015). Such task was accomplished in Power Query where the numbers and letters were divided into two separate columns where the one with only numbers was named “*Início*” and the latter was named “*Fim*”. In the first column, all entries were reformatted to “*mm/yy*” through a tool that enables the user to create a column called “*Add column from selected examples*”. Having an existing column as an example, with this option, the user can insert a few entries in the first rows of the new column with the desired format, which the program then uses as a basis for automatically writing the query to fill all other rows. For the second column, if the cell was empty, meaning that the dates for the beginning and end of the delivery were the same, the value was

copied from the “*Início*” column, whereas if the cell contained any value, a count was done on the number of letters and the obtained value was added in the form of months to the previous column. With more than 10.000 rows of entered data, this tool proved to be of great help, saving a lot of time on a task that would otherwise be very protracted.

Another important step in cleaning the data in this file was transforming the columns for the supplier, the buyer, and the amount. Firstly, the supplier and buyer columns were separated as well as the amount purchased, and amount sold. This format resulted in blank rows considering that if the transactions were purchases, only the supplier and amount purchased were filled, leaving the other two empty; whereas if the transactions were sales, the opposite would occur. Consequently, the solution was to aggregate the supplier and buyer columns into a new column as well as the amount purchased and amount sold, while also adding an identifier for the type of transaction in the following column. The final result now is that, for example, if the transaction is a sale, the name of the customer is recorded in the new column called “*Fornecedor / Cliente*” and the amount in a column called “*Quant. Compra / Venda*”. The following column has the identifier for the transaction where if it is purchase it has a “*C*” (of *compra*) and if it is a sale it has a “*V*” (of *venda*). With these steps, four columns were converted into three and blank rows were avoided providing more accuracy to the values obtained later on in the analysis.

After having all the data gathered in a single table with the correct format, the next phase was to get the necessary pivot tables for the **Dashboard(1)**. This tool is a must-have in all analysis systems since it is an easy-to-read summary of the information, enabling decision-makers to profile customers, measure and investigate critical business operations, rank employees, ”drill-down” through sales, and customise reports.

A total of seven different pivot tables were created to achieve the final result as shown in **Figure 4.12**, for the four graphs, the pie chart, the total sales values and the sparklines for the bottom left table. A filter for the date and the salesperson was

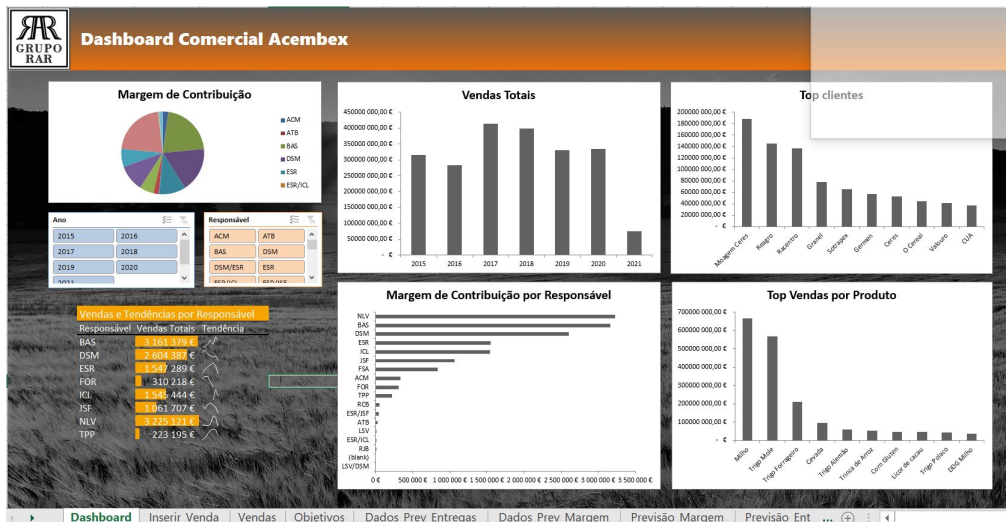


Figure 4.12: Dashboard for the commercial department

also added to the dashboard. Since sometimes Excel does not correctly update all pivot tables, queries, graphs and formulas in a file, a macro was added to the logo of the RAR Group in the top left corner where every time a user presses it, all of the above-mentioned pivot-tables and queries are updated automatically. Also, given that this dashboard is only to be used by the upper management, it was requested to not be available to other users. To fulfil this requirement, the sheet with the dashboard was “*very hidden*”. By performing the conventional steps for hiding a sheet, which are right clicking in the sheet’s name and selecting the “*Hide*” option, the user can later access the list of hidden sheets. Thus, the traditional option did not fulfill the requirements that were requested. As such, the solution was to resort to a hidden function that VBA has, which is to place the sheet in a state called “*very hidden*”, where it does not appear in the list of hidden sheets and in order to unhide it, the user has to go to the sheet’s properties in the VBA editor.

Another major improvement, apart from the **Dashboard(1)**, was the introduction of the “**Inserir_Venda**”(2) sheet which features two separate tables, a slicer and two *ActiveX Control* buttons. This sheet is the “control center” for this file and its final layout can be seen in **Figure 4.13**.

Tipo	Quantidade	Margem	Margem unitária	Vendas	Contribuição
Plano	846 345	1,66%	3,20 €	162 637 024,00 €	2 705 274,00 €
Real	17 840	2,51%	5,21 €	3 698 415,84 €	92 874,66 €
Cumprido	2%	151%	163%	2%	3%
Desvio	-828 505	0,85%	2,01 €	-158 938 608,16 €	-2 612 399,34 €
Ativos	387 418	0,00%	2,91 €	79 028 121,84 €	1 127 801,81 €

Ano	Quantidade	Margem	Margem unitária	Vendas	Contribuição
2015	990 507	1,47%	2,53 €	170 128 000,00 €	2 503 000,00 €
2016	994 831	1,52%	2,76 €	180 491 350,00 €	2 747 113,00 €
2017	1 151 430	1,36%	2,47 €	208 575 531,00 €	2 842 780,00 €
2018	1 008 000	1,55%	2,78 €	180 997 000,00 €	2 799 000,00 €
2019	1 028 827	1,49%	2,89 €	199 936 000,00 €	2 976 000,00 €
2020	1 030 000	1,60%	2,85 €	185 000 452,00 €	2 940 000,00 €
2021	846 345	1,66%	3,20 €	162 637 024,00 €	2 705 274,00 €

Figure 4.13: "Inserir_Venda" sheet layout

Having as a reference **Figure 4.13**, the slicer on the bottom-left corner is to select the year for the data that will show in the report table and it is connected to all the pivot tables that were created to obtain the needed variables for this table. Hence, if a year is selected in the slicer, all values in the top left table are filtered and all measures are further computed. This table serves as a state of affair for the sales department regarding the proposed sales plan for the year. As a complement to this table, the table on the right side of **Figure 4.13** is the proposed plan for every year, which is manually inserted by the user in the beginning of each year. Whenever a year is selected in the slicer, resorting to a *VLOOKUP () function*, the corresponding plan is fetched to fill-in the first row of the left-side table and the following rows are all calculations that are performed based on the selected year as well.

The two *ActiveX Control* buttons, inserted in the blue stripe in **Figure 4.13**, open two separate *UserForms* (shown in the left and right side of **Figure 4.14**) that are very similar to the ones created for the TD. In the "Adicionar Venda" *Userform*, demonstrated in the left side of **Figure 4.14**, the user can insert all the information related to the sale or purchase contract which is then printed in the last available row in the "Vendas" sheet when the "Adicionar venda" button is pressed. Whenever the *UserForm* is opened, a list for the suppliers and clients is retrieved (obtained through a query) and then stored in the corresponding *ComboBox*, done to avoid any inaccuracy while entering data. The text boxes for inserting the dates for the contract have the same limitations as in the "Confirmings" file since a calendar type button was unfeasible in this file as well. There are also four option buttons for users



Figure 4.14: "Adicionar Venda" and "Corrigir ou Eliminar Venda" Userforms

to list if the transaction was a purchase ("C"), sale ("V"), a carried over purchase from previous years ("CT") or a carried over sale from previous years ("VT"). All boxes have data validation process to further diminish the possibility of faulty data. The "Limpar" buttons empty all boxes and resets the dates to the current day and the "Sair" button exits the *UserForm*.

In the "Corrigir ou Eliminar Venda" *UserForm*, illustrated on the right side of **Figure 4.14**, all boxes perform just as in the previously analysed form, except for the *IDVenda* box (a list of the IDs of all the inserted rows). Whenever an ID is selected, all the information related to that contract is acquired and printed in the corresponding text box, resorting to a *VLOOKUP()* *Worksheet Function*. With the collected information the user can either modify it, resorting to the "Corrigir Venda" button or eliminate the contract from the database with the "Apagar Venda" button.

The **Vendas(3)** sheet was obtained through an OLE DB Query connection, similar to the way the *Annual Treasury file* was attained, as stated in Section 4.3.3.

The **Objetivos(4)** sheet is a table to compare the planned and the actual values for the top 23 clients in terms of total sales in quantity, contribution margin, total sales in value and unitary contribution margin so that the commercial department can keep track of what percentage of the objectives have already been met. This particular table was a requirement from top management.

The last four sheets, named **Dados_Prev_Entregas(5)**, **Dados_Prev_Margem(6)**, **Previsão_Margem(7)** and **Previsão_Ent(8)**, were created to enable a forecast analysis on the two major KPI's for this department - the daily deliveries and the daily contribution margin. The “*Dados_Prev_Entregas*” is a table generated through a query that aggregates by day the values for the expected deliveries to be due on that specific date, while the “*Dados_Prev_Margem*” is also a table generated through a query but instead of the delivery values it contains the contribution margin values also aggregated by day. These queries were created to enable the user to exploit the “*Forecast sheet*” analysis option that Excel offers, as seen in **Figure 4.15**. Since Acembex’s users are not familiar with forecasting tools, much less a custom forecast model, this tool was used seeing as through a simple couple of clicks a full forecast model is created. If the user is more familiar with forecasting models, this tool also has a few customization options, such as adding a seasonality, selecting the confidence interval, the date for the forecast to end or methods for filling missing points in data. After selecting the create button on the forecasting tool, a sheet is created that contains a table and a graph. The table contains five columns: date, (selected variable for forecasting), forecast, lower confidence bound, and upper confidence bound. The second column has all the values for the historical data while the last three have the forecasting values for the selected future dates and the expected lower and upper bounds. The graph is a visual representation of both the historical values, the forecasting values, and the mentioned bounds.

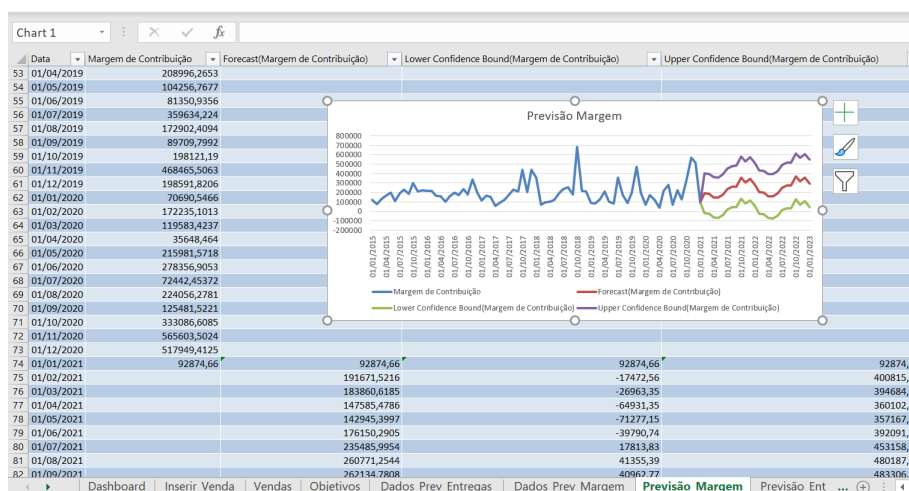


Figure 4.15: Example of the Previsão_Margem(7) sheet

This tool is expected to aid the upper management when writing reports for the Holding company as well as assist in the daily decision-making process by allowing a more information-based decision.

4.3.5 Annual Sales

Resembling the “*Annual Treasury File*”, the “*Annual Sales*” file is a collection from the “*Daily Sales*” file of the values for the current year. The tables available in this file have all been produced through OLE DB Query connections to the table in the “*Daily Sales*” file, totalling five different connections. The reason for choosing this type of connection is as mentioned above - in subsection 4.3.3 - due to its simplicity, lightness, and speed.

4.3.6 Additional documentation

Along with all the above-mentioned files that were created, two additional Word documents were devised, one for each department, containing all information the users need to know on how to exploit all of the file’s functionalities. Seeing as the user needs to know how to install and use a software system, how to import and manage data, how to elaborate information or how to overcome any possible error or obstacle, consistent documentation that describes every procedure is necessary. This documentation consists of two documents aiming to explain the functionalities the software performs, its architecture, how it is structured and implemented, and how it can be used.

Chapter 5

Post-implementation analysis

As stated by Muriithi and Kotzé (2013), each potential BI tool requires an evaluation on its suitability, both before and after their possible implementation. Hence, all systems were subject to an evaluation, not only prior to their reconditioning, but also after completion. Consequently, these systems were assessed according to their suitability to Acembex's, being subject to a range of evaluation factors, such as business improvements, technical viability, risks and organisational impact.

This chapter is an appraisal of each tool according to defined parameters, taking into account, not only the execution process but also document quality and structure.

5.1 Elaborated questionnaires

A total of four different *Google Forms* were created, which are embedded in Annexes K, L, M and N. This was done because this project involved the renovation of files on two different departments and that for each department, a before and after analysis had to be performed. Thus, for each department, two separate forms were created, totalling four forms. Sub-sections 5.1.1 and 5.1.2 examine the files previously in use and the files developed and implemented on the Treasury and Commercial department, respectively.

Considering that the company only has fifteen employees and that the files were created for two of the company's departments, it is important to keep in mind that the questionnaires were answered by only a few people (sometimes only two or three), which can create an information bias, due to the low size of the sample.

As mentioned, *Google Forms* was used as an evaluation tool since it enables the creation of custom questionnaires. In BI&A systems, the quality and suitability of the produced information are referred to as Information Quality (IQ), whereas System Quality (SQ) is concerned with the input in the system and the quality of the IS (software). Since the goal is to base subsequent decisions on the output from the system, it is a major factor that these decisions are supported by both IQ (output) and SQ (input). Thus, it is vital to examine not only if the system produces both, but also if it is user-friendly and whether the transition process went smoothly.

For this reason, two different dimensions were evaluated: **document structure quality (1)** and **document content quality (2)** according to the criteria developed by Aversano et al. (2017). The structure dimension (1), evaluates the documents according to their:

- ☰ **Structuring**: aims at evaluating the quality of the actual structure in terms of number of files, sheets, tables, document length, and density of tables and figures;
- ☰ **Dimension**: tries to analyse the length of the document structure, reviewing if tables or dashboards are too big or difficult to examine or too short that they may not correctly express a concept;
- ☰ **Graphical Support**: seeks to verify the availability of visual aids (figures, tables, dashboards or graphs) that facilitate the understand-ability of the information;
- ☰ **Updating or Alignment**: attempts to confirm whether the documentation is updated and aligned concerning the main database;
- ☰ **Readability**: strives to examine if the tables, dashboards, figures and graphs express clear and understandable concepts;
- ☰ **Completeness**: this quality indicator checks whether the documentation describes all of the original dimensions (previous files);
- ☰ **Usability**: aims to assess the usefulness of the files in the organisation.

Whereas in the latter (2), the assessed dimensions are:

- ⊠ **Adaptability**: attempts to evaluate if the documentation adequately adapts to the supported operating systems and database management systems in the organisation;
- ⊠ **Replace-ability**: tries to assess the likeliness of replacing the current system with a different one;

- ⊠ **Migration:** seeks to verify whether the documentation adequately migrates information between different reports or documents;
- ⊠ **Interoperability:** aims to estimate how the various documentations interact with each other;
- ⊠ **Configuration:** strives to analyse the ease of configuration in a new computer;
- ⊠ **Customisation:** makes an effort to confirm the allowed customization degree in the full system, user interface, workflows, and reports.

As already mentioned, this method of evaluating the structure and content of the document was based on a process proposed by Aversano et al. (2017), that argument that the user needs to know how to install and use a software system as well as how to import, manage and elaborate both data and information.

5.1.1 Questionnaires for Treasury Department

As it has been referred, from the four developed forms, two of those were separate questionnaires, developed for the TD: one for assessing the system previously in use (Annex K) and another for evaluating the developed tools (Annex L).

Analysis of the previous files (Annex K)

The first form is a questionnaire comprised of a set of questions that intend to understand what were the bottlenecks in the system and where improvements were mandatory.

The main conclusions that were derived from this questionnaire were that:

- ✚ On average, each worker expended **twenty minutes** to maintain all files updated daily;
- ✚ On average, each worker expected that the new system would economize **five minutes**;
- ✚ On average, it took each worker **forty seconds to a minute** to find a specific transaction or entry within the local files;
- ✚ There is an average of **1,5 confirmings** to be registered daily;
- ✚ There were **no data validation procedures** to ensure IQ and SQ.

Analysis of the developed files (Annex L)

To be able to perform a quantitative analysis on the improvements, a follow-up questionnaire was created. This form is divided into eight different sections that evaluate different parameters on each file. These sections are:

- Ficheiro dos Confirmings* or Confirmings file
- Ferramenta de otimização* or Optimization tool
- Utilização média mensal* or Average Monthly Usage
- Necessidades de Financiamento* or Activity needs
- Novo ficheiro agregado* or New aggregated file
- Ficheiro Word* or Word file
- Avaliação Geral* or Overall evaluation

From this questionnaire, it was possible to gather the following conclusions:

- 🏠 On average and daily, each worker considers that **fifteen minutes** were saved, by the new system, when maintaining all files updated;
- 🏠 On average, the system saved **three times more** than expected;
- 🏠 Each worker now takes **ten seconds** to find or eliminate a specific entry from the database;
- 🏠 The **existence of data validation procedures** brought a greater sense of security when entering data;
- 🏠 The **performance** of the whole system received an average grade of 9;
- 🏠 In terms of **Practicality, Reliability, Usability and Adaptability, Interoperability, Configuration**, the new system was rated, on average, a grade of 9;
- 🏠 Regarding the **Structuring, Dimension, Updating easiness, Readability, Completeness, Replace-ability, Migration** and the **Customization**, the new file was granted an average grade of 8;
- 🏠 The **Visual Appeal** of the system was rated at an average of 10;
- 🏠 The **Reliability of the optimisation tool** was, on average, granted a grade of 8;
- 🏠 The **Value of the optimisation tool** was rated at an average of 8;
- 🏠 On average, the workers consider that the optimisation tool saves **thirty minutes** daily;

Considering all of the above-gathered information and conclusions, it is possible to determine that in the TD, there was an average improvement of **1,92 points** in every dimension, as it is possible to observe in **Table 5.1**.

Dimension	Before	After
Structuring	6	8
Dimension	6	8
Graphical Support	5	10
Updating easiness	7	8
Readability	7	8
Completeness	6	8
Usability	8	9
Adaptability	8	9
Replace-ability	7	8
Migration	6	8
Interoperability	6	9
Configuration	6	9
Customization	7	8

Table 5.1: Analysis of the before and after in the TD system

5.1.2 Questionnaires for Commercial Department

Similar to the questionnaires for the TD, two forms were also created for the CD: one to analyse the previously used files (Annex M) and another for rating the developed system (Annex N).

Analysis of the previous files (Annex M)

The third form was comprised of a set of questions that intend to gain new insights on the frailties and obstacles of using the files daily. This questionnaire has twenty different questions to assess what were the main congestion points in the previous systems as well as uncover where revamps were required.

Through this analysis it was possible to conclude that:

- ✦ On average and daily, each worker consumed **five minutes** to maintain the sale file updated;
- ✦ The biggest bottleneck was the **absence of data validation procedures** (including the possibility of having duplicates), **having to break down sales by months** and **the procedure for inserting shipping**;
- ✦ Regarding the **Structuring, Dimension, Readability, Completeness, Usability, Adaptability, Migration, Configuration, Customization** of the previous file, an average grade of 8 was provided;
- ✦ As for the **Graphical Support**, an average grade of 5 was given;
- ✦ Regarding the **Updating easiness**, an average grade of 9 was granted;
- ✦ The **Replace-ability** and **Reliability** were graded at an average of 7;
- ✦ The **Interoperability** was rated at an average of 6;
- ✦ Lastly, on a scale of 1 to 10, the **degree of urgency** for a new file was rated at 8.

Having the analysis performed in Chapter 4 as a reference, these results can come as a surprise. For example, the previous file had no graphical support whatsoever, yet it was graded at an average of 5. Another example can be the fact that the previous file was rated an 8 in structuring, despite having all the data structuring obstacles enumerated in Subsection 4.3.4.

Analysis of the newly implemented files (Annex N)

As in sub-section 5.1.1, a questionnaire was also developed to perform a quantitative analysis on the improvements, present in Annex N.

This form is divided into three different sections which are:

🔖 *Novo ficheiro das Vendas* or New Sales file

🔖 *Ficheiro Word* or Word file

🔖 *Avaliação Geral* or Overall evaluation

Resorting to this questionnaire, it was possible to obtain the following insights:

- 🏠 On average, and daily, each worker now takes **eight minutes** to keep all files up-to-date;
- 🏠 The biggest bottleneck in the new system is also having to **break down sales by month**;
- 🏠 It is considered that the new system **did not bring any significant changes** in terms of time savings;
- 🏠 In terms of **Reliability, Structuring, Dimension, Adaptability** and **Configuration** the system received an average grade of 8;
- 🏠 The **Overall performance** of the system was rated an average of 8;
- 🏠 The **Graphical Support, Updating easiness, Readability, Completeness** and **Usability** 9;
- 🏠 The degree of **Replace-ability** was rated an average of 5;
- 🏠 The **Migration** capacity of the system was graded at an average of 6;
- 🏠 The **Interoperability** and **Customization** capacity was rated at 7;
- 🏠 Lastly, as for the **Word files**, in terms of **Usability** it received an average grade of 10, whereas in **Structuring** it received a grade of 9;

Therefore, having all of the above-gathered information compiled in **Table 5.2**, it possible to conclude that each dimension has improved an average of **0,23 points** in every dimension.

Dimension	Before	After
Structuring	8	8
Dimension	8	8
Graphical Support	5	9
Updating easiness	9	9
Readability	8	9
Completeness	8	9
Usability	8	9
Adaptability	8	8
Replace-ability	7	5
Migration	8	6
Interoperability	6	7
Configuration	8	8
Customization	8	7

Table 5.2: Analysis of the before and after in the CD system

The most surprising conclusions that can be derived from **Table 5.2**, are that despite the fact that the previous system had absolutely no graphical support it was rated at 5 (instead of 0). The usability and adaptability of a system that was unstructured, not connected, non-customizable and unformatted were rated at 8, whereas the new system received a 9. In terms of replace-ability, the previous system (which was actually replaced) received an average grade of 7, while the new one (with Power Query connections, dashboards, correct formatting, among many others) was rated at 5. The previous system, which had absolutely no capacity of migrating information to other external sources was rated at an average of 8 while the new system, which has OLE DB Query connections, was rated at an average of 6. At the same time, a contradictory grade of 7 in interoperability was given to the new file, as opposed to the previous one which was rated at 6. Additionally, workers now take three more minutes to keep the system updated, which can be expected since it is a new tool and system that requires an adaptation period.

These low improvement values, for the enhancements mentioned in sections 5.1.1 and 5.1.2, can be due to an effect proposed by Kim et al. (2017a), called the **Dunning-Kruger effect**. This phenomenon is a form of self-enhancement bias that can lead most people to possess positive but unrealistic perceptions of themselves or their environment. Another similar phenomenon is the **Better-than-average effect** in which most people *"value their abilities as better than average even though it is statistically impossible for most people to have better-than-median abilities"* proposed by Kim et al. (2017b). These effects may have lead workers to overestimate the value of the previous system and diminish the improvements proposed with the new system.

5.2 Proposed Improvements

As stated in the Forrester Research¹, BI&A can be defined as *"integrated approaches to management support through a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision-making."* Despite BI&A being able to leverage value from data, it largely depends on the support given by upper management, which means that one of the key criteria when making decisions about investing in BI&A should be whether the investment supports the business strategy set by managers.

One way to justify this investment can be, for example, through calculating the Return On Investment (ROI). Nevertheless, it can be said that classical financial methods do not represent the best approach to justify investments in BI&A. This is mainly due to the intangible nature of the benefits obtained with BI&A tools since a bigger challenge than measuring the costs of BI&A is measuring its benefits. A great portion of the generated effects consists mainly of non-financial and even intangible benefits. An example of such gains can be the improved quality and timeliness of information. Despite the possibility of having non-financial improvements that can

¹<https://www.forrester.com/>

further lead to financial outcomes, such as cost savings, a time gap between the acquisition of information from BI&A and the related financial gain, may occur. Therefore, the efficient measurement of BI&A benefits may be a challenging task.

Thus, before deciding whether to proceed towards a more technological future through BI&A, the decision-makers need to evaluate both the purposes and the type of investment required. This analysis can further ease the process of determining whether the investment is beneficial to the company's well being.

The following Table shows the proposed method by Remenyi et al. (2007), where an assessment of the investment can be performed, based on its purpose and type, to then identify the evaluation method.

Table 5.3: Purposes and types of investments, and evaluation methods

Purpose (1)	Type (2)	Evaluation method(3)
Business survival	Essential	Continuation/ Termination of business
Increase in efficiency	Vital	Cost-Benefit Analysis
Increase of effectiveness	Critical	Business Analysis
Competitive advantage	Strategic/Reputation	Strategic Analysis
Infrastructure improvement	Architectural/ Organisational	Long-term impact analysis

Source: Remenyi D., Bannister F., & Money A., 2007, p. 107.

Considering the above-performed analysis on Acembex, and framing it within the table's parameters, it is reasonable to assume that, currently, the purpose of the investment would be to (1) **increase efficiency** and therefore its type would be (2) **vital**. Hence, the evaluation method should be a (3) **cost-benefit analysis**. This analysis must take into consideration not only the immediate costs but also bear in the mind the non-financial and intangible benefits that usually occur in a later stage. As such, it must consider not only a short-term but also a long-term analysis.

After the cost-benefit analysis is performed, the next logical step is making the needed tools. The designed BI&A tools may be general-purpose BI&A tools or vertical BI&A platforms. The first type of tool presses companies to rely on a team of IT specialists to build the BI&A system and adapt it according to the company's specific requirements, whereas, on the other hand, the vertical BI solutions are specially designed packages for a particular industry or sector. These solutions have modular functionalities that include, for example, *dashboards*, *business data visualisation in geographical format*, *what-if analysis* and *interactive reports*.

Since Acembex can be said to operate within the Retail industry and Banking industry, many applications and benefits that can be extracted from BI&A tools. In the Retail industry, an example of BI&A application can be its use for demand forecasting by generating reliable estimates for both short and long-term demand based on the available customer data. This allows a better product distribution planning thus ensuring that stocks will always be in place to meet customer expectations. In the Banking industry, BI&A can help managers to improve operational and strategic decisions, based on better and more timely information. Additionally, not only can potential customers be targeted through the analysis of historical data, but also cross-selling opportunities can be identified through an analysis of customer behaviour.

Having all of this in mind, one possible improvement, suitable to Acembex's ways of operating, would be to adopt **Cloud Computing** (CC). As argued by Muriithi and Kotzé (2013), this technology enables companies to shift the traditional model of viewing computing as a product, owned and operated in-house, to one that perceives computing as a service that is delivered to consumers, over the Internet, from large data centres or *clouds*. As such, it enables universal, practical and on-demand network access to a reservoir of customizable compute resources that can easily be supplied and delivered with minimum effort or interaction with the service provider. The adoption of CC can equip companies with an easy opportunity to embrace BI&A since, compared to traditional systems, it breaks down barriers of high cost, complexity, and lack of expertise (Muriithi and Kotzé, 2013).

Adopting a CC model can lower these barriers and accelerate the pace of BI&A adoption since it is offered as a service over the Internet. Nevertheless, migrating BI&A systems from traditional on-premises settings to the "*cloud*" does present huge challenges which need to be considered.

Chapter 6

Conclusion

The aim of a company or organisation when adopting BI&A must be to (1) democratise data, (2) focus on preparing employees for embracing a new approach and (3) how they ask the right questions, (4) understand how to meaningfully analyse the data, and (5) use it to add value to the business through knowledge collaboration.

According to Davenport et al. (2001), *"the decision to centralize, decentralize, or outsource analytic initiatives is contingent on the sophistication of analysis, the amount of local knowledge needed for decision making, and the cultural orientation of the firm"*. Besides, having a culture within the organisation that values decisions based on data is critical to the success of analytic initiatives.

Although there is a constant growth in the number of BI&A tools, spreadsheets still dominate, especially within SMEs, while cloud-based technologies and advanced analytics capabilities are not yet the norm. As such, despite an ever-increasing interest in BI&A, empirical research shows that SMEs are still lagging in the proliferation of BI&A (Llave, 2017). As a proposed measure to increase the degree of BI&A adoption, CC can be the first major step in this journey, since both are becoming progressively important in gaining and maintaining a competitive edge (Ouf and Nasr, 2011).

In this thesis, BI&A was identified as a technology that bears value to a company, alongside the challenges of implementing it. This estimation was followed by an analysis of the degree of BI&A adoption in Acembex as well as an evaluation of the BI&A systems in Acembex. Furthermore, all the most important changes and gains were discussed and weighted. To assess the achieved improvements, *Google forms* were used as a tool for quantitative measuring. The culmination of this work is an appraisal of the measured improvements and suggested measures for further enhancement.

Acembex can now be said to be in the mid-stages of *Analytics 1.0*, according to the criteria proposed by Davenport (2018). From unstructured to structured data, from slow, painstaking processes to swift, straightforward tasks but, most importantly, from the absence of Descriptive and Prescriptive Analytics to the presence of optimisation tools, dashboards and forecasting models. Hopefully, Acembex will continue to develop their BI&A capabilities as promptly as it has until this moment.

For the purpose of the investigation, a case study of the application of BI&A tools was used and, therefore, when generalising these findings, researchers should proceed with caution. Additionally, it is also highly recommendable that future studies examine different sectors and contexts in which BI&A can be implemented in SMEs.

Throughout this case study, some of the benefits were identified such as improvements in data support, decision support, and savings, as well as challenges related to the degree of usage, the value of the solutions, data quality and interfaces fit. Nevertheless, the intangible nature of the benefits of these technologies can hinder the process of quantifying them. Moreover, the strategic nature of BI&A and its effects on business culture are some additional reasons why evaluation is challenging.

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Annex A - *IFS () Functions code*

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Public Function ifsfunction(CalculateCell As Range, -  
                            ColumnOffset As Long, -  
                            ColumnOffset1 As Long, -  
                            ColumnOffset2 As Long, -  
                            ColumnOffset3 As Long, -  
                            ColumnOffset4 As Long) As Double  
  
    Dim sh As Worksheet  
    Dim list As ListObject  
    Dim xTtl As Double  
    Dim xCell As Range  
    Dim fatura As Double  
    Dim spread As Double  
    Dim eur As Double  
    Dim dias As Integer  
  
    Application.Volatile  
    Set sh = ThisWorkbook.Sheets("Confirmings")  
    For Each xCell In CalculateCell  
        fatura = xCell.Offset(, ColumnOffset1).Value  
        spread = xCell.Offset(, ColumnOffset2).Value  
        eur = xCell.Offset(, ColumnOffset3).Value
```

```

dias = xCell.Offset(, ColumnOffset4).Value
If xCell.Offset(, ColumnOffset).Value = "DB" Then
    xTtl = fatura * (spread + eur) * (dias / 360)
ElseIf xCell.Offset(, ColumnOffset).Value = "Novo Banco"
    Then xTtl = fatura * (spread + eur) * (dias / 360)
ElseIf xCell.Offset(, ColumnOffset).Value = "BCP"
    Then xTtl = fatura * (spread + eur) *
        (dias / 360) * 1.04
ElseIf xCell.Offset(, ColumnOffset).Value = "CGD"
    Then xTtl = fatura * (spread + eur) * (dias / 360)
ElseIf xCell.Offset(, ColumnOffset).Value = "BPI"
    Then xTtl = fatura * (spread + eur) *
        (dias / 360) * 1.04
ElseIf xCell.Offset(, ColumnOffset).Value = "BIC"
    Then xTtl = fatura * (spread + eur) *
        (dias / 360) * 1.04
End If
Next
ifsfuction = xTtl
End Function

Public Function ifsfuction2(CalculateCell As Range, -
    ColumnOffset As Long, -
    ColumnOffset1 As Long, -
    ColumnOffset2 As Long, -
    ColumnOffset3 As Long, -
    ColumnOffset4 As Long, -
    ColumnOffset5 As Long)

    As Double

Dim sh As Worksheet
Dim list As ListObject
Dim xTtl As Double
Dim xCell As Range

```

```

Dim fatura As Double
Dim spread As Double
Dim eur As Double
Dim dias As Integer

Application.Volatile
Set sh = ThisWorkbook.Sheets("Confirmings")
For Each xCell In CalculateCell
    fatura = xCell.Offset(, ColumnOffset1).Value
    spread = xCell.Offset(, ColumnOffset2).Value
    eur = xCell.Offset(, ColumnOffset3).Value
    dias = xCell.Offset(, ColumnOffset4).Value
    taxa = xCell.Offset(, ColumnOffset5).Value
    If xCell.Offset(, ColumnOffset).Value = "DB" Then
        xTtl = taxa

    ElseIf xCell.Offset(, ColumnOffset).Value =
"Novo Banco" Then xTtl = fatura * taxa
    ElseIf xCell.Offset(, ColumnOffset).Value = "BCP" Then
        xTtl = fatura * taxa * 1.04
    ElseIf xCell.Offset(, ColumnOffset).Value = "CGD" Then
        xTtl = fatura * (spread + eur) *
(dias / 360) * taxa
    ElseIf xCell.Offset(, ColumnOffset).Value = "BPI" Then
        xTtl = fatura * taxa * 1.04
    ElseIf xCell.Offset(, ColumnOffset).Value = "BIC" Then
        xTtl = fatura * taxa * 1.04
    End If
Next
ifsfuction2 = xTtl
End Function

```

Annex B - *Novo Confirming* *UserForm code*

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Private Sub CalculateButton_Click()  
  
Dim sh As Worksheet  
Dim linha As Integer  
Dim list As Object  
Dim dif As String  
Dim x As Integer  
  
Set sh = ThisWorkbook.Sheets("Spreads")  
Set list = CreateObject("System.Collections.ArrayList")  
  
,,,,, Solver Manual ,,,,,,  
  
linha = 2  
Do Until linha = 8  
dif = sh.Cells(linha, 7) - Me.MontanteBox
```

```

If dif > 0 Then
    If sh.Cells(linha , 1) = "Novo Banco" Then
        nb = Me.MontanteBox.Value * (sh.Cells(linha , 2) +
            sh.Cells(linha , 3)) * ((DateDiff("d" ,
            txtStartDate.Value , txtDueDate.Value)) / 360) +
            Me.MontanteBox.Value * sh.Cells(linha , 4)
        list.Add nb
    End If

    If sh.Cells(linha , 1) = "BCP" Then
        bcp = Me.MontanteBox.Value * (sh.Cells(linha , 2) +
            sh.Cells(linha , 3)) * ((DateDiff("d" ,
            txtStartDate.Value , txtDueDate.Value)) / 360) +
            Me.MontanteBox.Value * sh.Cells(linha , 4) * 1.04
        list.Add bcp
    End If

    If sh.Cells(linha , 1) = "BIC" Then
        bic = Me.MontanteBox.Value * (sh.Cells(linha , 2) +
            sh.Cells(linha , 3)) * ((DateDiff("d" ,
            txtStartDate.Value , txtDueDate.Value)) / 360) * 1.04 +
            Me.MontanteBox.Value * sh.Cells(linha , 4) * 1.04
        list.Add bic
    End If

    If sh.Cells(linha , 1) = "CGD" Then
        cgd = Me.MontanteBox.Value * (sh.Cells(linha , 2) +
            sh.Cells(linha , 3)) * ((DateDiff("d" ,
            txtStartDate.Value , txtDueDate.Value)) / 360) +
            Me.MontanteBox.Value * (sh.Cells(linha , 2) +
            sh.Cells(linha , 3)) * ((DateDiff("d" , txtDueDate ,
            txtStartDate)) / 360) * sh.Cells(linha , 4)
        list.Add cgd
    End If

```

```

    If sh.Cells(linha, 1) = "BPI" Then
        bpi = Me.MontanteBox.Value * (sh.Cells(linha, 2) +
            sh.Cells(linha, 3)) * ((DateDiff("d",
            txtStartDate.Value, txtDueDate.Value)) / 360) * 1.04 +
            Me.MontanteBox.Value * sh.Cells(linha, 4) * 1.04
        list.Add bpi
    End If

    If sh.Cells(linha, 1) = "DB" Then
        Db = Me.MontanteBox.Value * (sh.Cells(linha, 2) +
            sh.Cells(linha, 3)) * ((DateDiff("d",
            txtStartDate.Value, txtDueDate.Value)) / 360) * 1.04 +
            sh.Cells(linha, 4)
        list.Add Db
    End If

Else
    y = Me.MontanteBox
    list.Add y

End If

linha = linha + 1

Loop

x = 0

Do Until WorksheetFunction.Min(list.ToArray) = list.Item(x)

x = x + 1

Loop

```

```
''''''Mensagem com o banco otimo''''''''
```

```
If sh.Cells(x + 2, 1) = "Novo Banco" Then  
    MsgBox "Escolha ótima áser o Novo Banco com um custo  
    financeiro de " & Format(nb, "0.00") & " euros",  
    vbInformation  
    Exit Sub  
End If
```

```
If sh.Cells(x + 2, 1) = "BCP" Then  
    MsgBox "Escolha ótima áser o BCP com um custo  
    financeiro de " & Format(bcp, "0.00") & " euros",  
    vbInformation  
    Exit Sub  
End If
```

```
If sh.Cells(x + 2, 1) = "BIC" Then  
    MsgBox "Escolha ótima áser o BIC com um custo  
    financeiro de " & Format(bic, "0.00") & " euros",  
    vbInformation  
    Exit Sub  
End If
```

```
If sh.Cells(x + 2, 1) = "CGD" Then  
    MsgBox "Escolha ótima áser a CGD com um custo  
    financeiro de " & Format(cgd, "0.00") & " euros",  
    vbInformation  
    Exit Sub  
End If
```

```

If sh.Cells(x + 2, 1) = "BPI" Then
    MsgBox "Escolha ótima áser o BPI com um custo
    financeiro de " & Format(bpi, "0.00") & " euros",
    vbInformation
    Exit Sub
End If

```

```

If sh.Cells(x + 2, 1) = "DB" Then
    MsgBox "Escolha ótima áser o DB com um custo
    financeiro de " & Format(Db, "0.00") & " euros",
    vbInformation
    Exit Sub
End If

```

''''''''Mensagens de erro''''''''

```

If VBA.IsNumeric(Me.MontanteBox.Value) = False Then
    MsgBox "Por favor insira um montante ávlido
    (énumrico)", vbCritical
    Exit Sub
End If

```

```

If Me.FornecedorBox.Value = "" Then
    MsgBox "Por favor insira um fornecedor ávlido",
    vbCritical
    Exit Sub
End If

```

```

If Me.txtStartDate.Value = False Then
    MsgBox "Por favor indique a data de íncio do
    contrato", vbCritical
    Exit Sub
End If

```

```

If Me.txtDueDate.Value = False Then
    MsgBox "Por favor indique a data de pagamento do
    confirming", vbCritical
    Exit Sub
End If

End Sub

Private Sub UserForm_Initialize()

'''''' Preencher IDbox ''''''

With ThisWorkbook.Sheets("Confirmings")
    Me.IDBox.Value = .Range("A" &
    Rows.Count).End(xlUp).Value + 1
End With

'''''' Preencher com os bancos ''''''

Dim i As Long
Dim n As Long
Dim sh As Worksheet

Set sh = ThisWorkbook.Sheets("Spreads")

n = sh.Range("A" & Application.Rows.Count).End(xlUp).Row

For i = 2 To n
    With ThisWorkbook.Sheets("Spreads")
        Me.BancoBox.AddItem CStr(sh.Cells(i, 1))
    End With
Next i

```

```

'''''' Preencher com os fornecedores ''''''

Dim y As Long
Dim f As Long
Dim forn As Worksheet

Set forn = ThisWorkbook.Sheets("Fornecedores")

f = forn.Range("A" & Application.Rows.Count).End(xlUp).Row

For y = 2 To f
With ThisWorkbook.Sheets("Fornecedores")
    Me.FornecedorBox.AddItem CStr(forn.Cells(y, 1))
End With
Next y

End Sub

Private Sub BancoBox_Change()
On Error Resume Next
Dim tbl As ListObject
Set tbl = Sheets("Spreads").ListObjects("Spreads")
Me.SpreadBox.Value =
    Application.WorksheetFunction.VLookup(
Me.BancoBox.Value, tbl.Range, 2, 0)
Me.ComissaoBox.Value =
    Application.WorksheetFunction.VLookup(
Me.BancoBox.Value, tbl.Range, 4, 0)
Me.EURBox.Value =
    Application.WorksheetFunction.VLookup(
Me.BancoBox.Value, tbl.Range, 3, 0)
On Error GoTo 0
End Sub

```

```
Private Sub UserForm_Activate()
```

```
txtPedido.Value = Format(Date, "dd/mm/yyyy")
```

```
txtStartDate.Value = Format(Date, "dd/mm/yyyy")
```

```
txtDueDate.Value = Format(Date, "dd/mm/yyyy")
```

```
End Sub
```

```
Private Sub CleanButton1_Click()
```

```
Me.MontanteBox.Value = ""
```

```
Me.FornecedorBox.Value = ""
```

```
Me.txtDueDate.Value = Format(Date, "dd/mm/yyyy")
```

```
Me.txtStartDate.Value = Format(Date, "dd/mm/yyyy")
```

```
Me.BancoBox.Value = ""
```

```
Me.EURBox.Value = ""
```

```
Me.txtPedido.Value = Format(Date, "dd/mm/yyyy")
```

```
Me.IDBox.Value = ThisWorkbook.Sheets("Confirmings").Range("A"  
& Rows.Count).End(xlUp).Value + 1
```

```
Me.SpreadBox.Value = ""
```

```
Me.ComissaoBox.Value = ""
```

```
End Sub
```

```
Private Sub CleanButton2_Click()
```

```
Me.MontanteBox.Value = ""
```

```
Me.FornecedorBox.Value = ""
```

```

Me.txtDueDate.Value = Format(Date, "dd/mm/yyyy")
Me.txtStartDate.Value = Format(Date, "dd/mm/yyyy")

Me.BancoBox.Value = ""
Me.EURBox.Value = ""

Me.txtPedido.Value = Format(Date, "dd/mm/yyyy")
Me.IDBox.Value = ThisWorkbook.Sheets("Confirmings").Range("A"
& Rows.Count).End(xlUp).Value + 1

Me.SpreadBox.Value = ""
Me.ComissaoBox.Value = ""

End Sub

Private Sub EURBox_AfterUpdate()
Dim PercentString As String

    If IsNumeric(EURBox.Value) Then

        PercentString = EURBox.Value

        EURBox.Value = Format(EURBox.Value / 100, "0.0000%")

    Else

        MsgBox "Por favor insira uma taxa Euribor ávlida
        (énumrica)", vbCritical

    End If
End Sub

Private Sub SairButton_Click()
    Unload Me
End Sub

```

```

Private Sub SubmitButton_Click()

'''''''''''''''' Validacao dos dados ''''''''''''''''

If VBA.IsNumeric(Me.MontanteBox.Value) = False Then
    MsgBox "Por favor insira um montante ávlido
(énumrico)", vbCritical
    Exit Sub
End If

If Me.FornecedorBox.Value = "" Then
    MsgBox "Por favor insira um fornecedor ávlido",
vbCritical
    Exit Sub
End If

If Me.txtStartDate.Value = False Then
    MsgBox "Por favor indique a data de íncio do
contrato", vbCritical
    Exit Sub
End If

If Me.txtDueDate.Value = False Then
    MsgBox "Por favor indique a data de pagamento do
confirming", vbCritical
    Exit Sub
End If

If Me.BancoBox.Value = "" Then
    MsgBox "Por favor selecione um banco", vbCritical
    Exit Sub
End If

```

```

If Me.txtPedido.Value = False Then
    MsgBox "Por favor indique a data do pedido do
    contrato", vbCritical
    Exit Sub
End If

If VBA.IsNumeric(Me.IDBox.Value) = False Then
    MsgBox "Por favor insira um ID ávlido (énumrico)",
    vbCritical
    Exit Sub
End If

'''''''' Verificacao de duplicados ''''''''

Dim sh As Worksheet
Set sh = ThisWorkbook.Sheets("Confirmings")
Dim n As Long

If Application.WorksheetFunction.CountIf(sh.Range("A:A"),
Me.IDBox.Value) > 0 Then
    MsgBox "Este ID áj áest íatribudo a outro confirming.
    Por favor confirme se a çãinformao áest duplicada",
    vbCritical
    Exit Sub
End If

'''''''''' Inserir/verificar ultima linha utilizada ''''''''''

n = sh.Range("A" & Application.Rows.Count).End(xlUp).Row

sh.Range("I" & n + 1).Value = CCur(Me.MontanteBox.Value)
sh.Range("C" & n + 1).Value = Me.FornecedorBox.Value
sh.Range("E" & n + 1).Value = Format(Me.txtStartDate.Value
"mm/dd/yyyy")

```

```

sh.Range("F" & n + 1).Value = Format(Me.txtDueDate.Value,
"mm/dd/yyyy")
sh.Range("B" & n + 1).Value = Me.BancoBox.Value
sh.Range("D" & n + 1).Value = Format(Me.txtPedido.Value,
"mm/dd/yyyy")
sh.Range("N" & n + 1).Value = CVar(Me.EURBox.Value)
sh.Range("A" & n + 1).Value = CLng(Me.IDBox.Value)
sh.Range("O" & n + 1).Value = CVar(Me.SpreadBox.Value)
sh.Range("P" & n + 1).Value = CVar(Me.ComissaoBox.Value)

Me.MontanteBox.Value = ""
Me.FornecedorBox.Value = ""

Me.txtDueDate.Value = Format(Date, "dd/mm/yyyy")
Me.txtStartDate.Value = Format(Date, "dd/mm/yyyy")

Me.BancoBox.Value = ""
Me.EURBox.Value = ""

Me.txtPedido.Value = Format(Date, "dd/mm/yyyy")
Me.IDBox.Value = ThisWorkbook.Sheets("Confirmings").Range("A"
& Rows.Count).End(xlUp).Value + 1

Me.SpreadBox.Value = ""
Me.ComissaoBox.Value = ""

MsgBox "Foi adicionado um novo confirming", vbInformation

End Sub

```

Annex C - *Atualizar Confirming UserForm code*

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Private Sub UserForm_Activate ()

    '''Adicionar drop-down list para o ID do confirming '''

    Dim sh As Worksheet
    Set sh = ThisWorkbook.Sheets("Confirmings")

    Dim i As Integer
    Me.IDBox.Clear
    Me.IDBox.AddItem ""

    For i = 2 To sh.Range("A" &
        Application.Rows.Count).End(xlUp).Row
        Me.IDBox.AddItem sh.Range("A" & i).Value
    Next i

End Sub

Private Sub UserForm_Initialize ()
```

```

'''''' Adicionar lista dos fornecedores ''''''

Dim y As Long
Dim f As Long
Dim forn As Worksheet

Set forn = ThisWorkbook.Sheets("Fornecedores")

f = forn.Range("A" & Application.Rows.Count).End(xlUp).Row

    For y = 2 To f
        With ThisWorkbook.Sheets("Fornecedores")
            Me.FornecedorBox.AddItem CStr(forn.Cells(y, 1))
        End With
    Next y

End Sub

Private Sub LimparButton_Click()

Me.MontanteBox.Value = ""
Me.FornecedorBox.Value = ""

Me.txtDueDate.Value = Format(Date, "dd/mm/yyyy")
Me.txtStartDate.Value = Format(Date, "dd/mm/yyyy")

Me.BancoBox.Value = ""
Me.EURBox.Value = ""

Me.txtPedido.Value = Format(Date, "dd/mm/yyyy")

Me.SpreadBox.Value = ""
Me.ComissaoBox.Value = ""

```

```
Me.IDBox.Value = ""
```

```
End Sub
```

```
Private Sub IDBox_Change()
```

```
'''''' Look up da informacao do confirming selecionado ''''''
```

```
If Me.IDBox.Value <> "" Then
```

```
    Dim sh As Worksheet
```

```
    Set sh = ThisWorkbook.Sheets("Confirmings")
```

```
    Dim i As Integer
```

```
    i = Application.Match(VBA.CLng(Me.IDBox.Value),  
sh.Range("A:A"), 0)
```

```
    Me.BancoBox.Value = sh.Range("B" & i).Value
```

```
    Me.FornecedorBox.Value = sh.Range("C" & i).Value
```

```
    Me.txtPedido.Value = Format(sh.Range("D" & i).Value,  
"dd/mm/yyyy")
```

```
    Me.txtStartDate.Value = Format(sh.Range("E" & i).Value,  
"dd/mm/yyyy")
```

```
    Me.txtDueDate.Value = Format(sh.Range("F" & i).Value,  
"dd/mm/yyyy")
```

```
    Me.MontanteBox.Value = sh.Range("I" & i).Value
```

```
    Me.EURBox.Value = sh.Range("N" & i).Value
```

```
    Me.SpreadBox.Value = sh.Range("O" & i).Value
```

```
    Me.ComissaoBox.Value = sh.Range("P" & i).Value
```

```
End If
```

```
End Sub
```

```

Private Sub EURBox_AfterUpdate()

Dim PercentString As String

If IsNumeric(EURBox.Value) Then

PercentString = EURBox.Value

EURBox.Value = Format(EURBox.Value / 100, "0.0000%")

Else

MsgBox "Por favor insira uma taxa Euribor ávlida
(énumrica)", vbCritical

End If

End Sub

Private Sub AtualizarButton_Click()

'''''''''''''''' çãValidao ''''''''''''''''

If VBA.IsNumeric(Me.MontanteBox.Value) = False Then

MsgBox "Por favor insira um montante ávlido
(énumrico)", vbCritical

Exit Sub

End If

If Me.FornecedorBox.Value = "" Then

MsgBox "Por favor insira um fornecedor ávlido",
vbCritical

Exit Sub

End If

If Me.txtStartDate.Value = False Then

```

```

    MsgBox "Por favor indique a data de início do
    contrato", vbCritical
    Exit Sub
End If

If Me.txtDueDate.Value = False Then
    MsgBox "Por favor indique a data de pagamento do
    confirming", vbCritical
    Exit Sub
End If

If Me.BancoBox.Value = "" Then
    MsgBox "Por favor selecione um banco", vbCritical
    Exit Sub
End If

If Me.txtPedido.Value = False Then
    MsgBox "Por favor indique a data do pedido do
    contrato", vbCritical
    Exit Sub
End If

If Me.EURBox.Value = "" Then
    MsgBox "Por favor insira uma Euribor", vbCritical
    Exit Sub
End If

If Me.SpreadBox.Value = "" Then
    MsgBox "Por favor insira um Spread", vbCritical
    Exit Sub
End If

If Me.ComissaoBox.Value = "" Then
    MsgBox "Por favor insira uma Comissão", vbCritical

```

```

Exit Sub
End If

'''''''''''''' Inserir/verificar ultima coluna ''''''''''''''

Dim sh As Worksheet
Set sh = ThisWorkbook.Sheets("Confirmings")
Dim n As Long

n = Application.Match(VBA.CLng(Me.IDBox.Value),
sh.Range("A:A"), 0)

sh.Range("I" & n).Value = CCur(Me.MontanteBox.Value)
sh.Range("C" & n).Value = Me.FornecedorBox.Value
sh.Range("E" & n).Value = Me.txtStartDate.Value
sh.Range("F" & n).Value = Me.txtDueDate.Value
sh.Range("B" & n).Value = Me.BancoBox.Value
sh.Range("D" & n).Value = Me.txtPedido.Value
sh.Range("N" & n).Value = CVar(Me.EURBox.Value)
sh.Range("A" & n).Value = CLng(Me.IDBox.Value)
sh.Range("O" & n).Value = CVar(Me.SpreadBox.Value)
sh.Range("P" & n).Value = CVar(Me.ComissaoBox.Value)

Me.MontanteBox.Value = ""
Me.FornecedorBox.Value = ""

Me.txtDueDate.Value = Date
Me.txtStartDate.Value = Date
Me.txtPedido.Value = Date

Me.BancoBox.Value = ""
Me.EURBox.Value = ""

```

```

Me.txtPedido.Value = Date
Me.IDBox.Value = ""
Me.SpreadBox.Value = ""
Me.ComissaoBox.Value = ""

MsgBox "O confirming foi atualizado", vbInformation

End Sub

Private Sub ApagarButton_Click()

'''''''' Apagar a linha selecionada ''''''''

Dim sh As Worksheet
Set sh = ThisWorkbook.Sheets("Confirmings")

Dim n As Long
n = Application.Match(VBA.CLng(Me.IDBox.Value),
sh.Range("A:A"), 0) - 1

Dim tbl As ListObject
Set tbl = sh.ListObjects("Confirmings")

tbl.Range.AutoFilter field:=1, Criteria1:=n

Application.DisplayAlerts = False

tbl.DataBodyRange.SpecialCells(xlCellTypeVisible).Delete

tbl.AutoFilter.ShowAllData

```

```
''''''''Reset dos valores do formulario''''''''
```

```
Me.MontanteBox.Value = ""
```

```
Me.FornecedorBox.Value = ""
```

```
Me.txtDueDate.Value = Date
```

```
Me.txtStartDate.Value = Date
```

```
Me.txtPedido.Value = Date
```

```
Me.BancoBox.Value = ""
```

```
Me.EURBox.Value = ""
```

```
Me.txtPedido.Value = Date
```

```
Me.IDBox.Value = ""
```

```
Me.SpreadBox.Value = ""
```

```
Me.ComissaoBox.Value = ""
```

```
MsgBox "O confirming foi apagado", vbInformation
```

```
End Sub
```

```
Private Sub SairButton_Click()
```

```
Unload Me
```

```
End Sub
```

Annex D - *VBA code on "Spreads" sheet*

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Private Sub AdicionarButton_Click()  
NovoConf.Show  
End Sub  
  
Private Sub AtualizarButton_Click()  
AtualizarForm.Show  
End Sub
```

Annex E - *SumVisible () Functions code*

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Option Explicit
```

```
Function Sumvisible(SumRange As Range, -  
                   Optional ColumnOffset As Long, -  
                   Optional Criteria As Variant, -  
                   Optional ColumnOffset2 As Long, -  
                   Optional Criteria2 As Variant, -  
                   Optional ColumnOffset3 As Long, -  
                   Optional Criteria3 As Variant) -
```

```
    As Double
```

```
    Dim xCell As Range
```

```
    Dim xTtl As Double
```

```
    Application.Volatile
```

```

If ColumnOffset = 0 Or IsMissing(Criteria) Then
    For Each xCell In SumRange
        If xCell.ColumnWidth > 0 And -
            xCell.RowHeight > 0 And -
            Not IsEmpty(xCell) And -
            IsNumeric(xCell.Value) Then
                xTtl = xTtl + xCell.Value
            End If
        Next
    Else
        For Each xCell In SumRange
            If xCell.ColumnWidth > 0 And -
                xCell.RowHeight > 0 And -
                Not IsEmpty(xCell) And -
                IsNumeric(xCell.Value) And -
                xCell.Offset(, ColumnOffset).Value <> Criteria
                And -
                xCell.Offset(, ColumnOffset2).Value <> Criteria2
                And -
                xCell.Offset(, ColumnOffset3).Value <> Criteria3
            Then
                xTtl = xTtl + xCell.Value
            End If
        Next
    End If
    Sumvisible = xTtl
End Function

Function Sumvisible2(SumRange As Range, -
    Optional ColumnOffset As Long, -
    Optional Criteria As Variant, -
    Optional ColumnOffset2 As Long, -
    Optional Criteria2 As Variant, -
    Optional CurrentYear As Long) As Double

```

```

Dim xCell As Range
Dim xTtl As Double
Dim Y As Variant

Application.Volatile

Y = Year(Date)

If ColumnOffset = 0 Or IsMissing(Criteria) Then
    For Each xCell In SumRange
        If xCell.ColumnWidth > 0 And _
            xCell.RowHeight > 0 And _
            Not IsEmpty(xCell) And _
            IsNumeric(xCell.Value) Then
            xTtl = xTtl + xCell.Value
        End If
    Next
Else
    For Each xCell In SumRange
        If xCell.ColumnWidth > 0 And _
            xCell.RowHeight > 0 And _
            Not IsEmpty(xCell) And _
            IsNumeric(xCell.Value) And _
            xCell.Offset(, ColumnOffset).Value = Criteria
            And _
            xCell.Offset(, ColumnOffset2).Value <> Criteria2
            And _
            xCell.Offset(, CurrentYear).Value = Y Then
            xTtl = xTtl + xCell.Value
        End If
    Next
End If

Sumvisible2 = xTtl
End Function

```

```

Function Sumvisible3(SumRange As Range, -
                    Optional ColumnOffset As Long, -
                    Optional Criteria As Variant, -
                    Optional ColumnOffset2 As Long, -
                    Optional Criteria2 As Variant, -
                    Optional ColumnOffset4 As Long, -
                    Optional Criteria4 As Variant, -
                    Optional ColumnOffset3 As Long, -
                    Optional Criteria3 As Variant) -
    As Double

Dim xCell As Range
Dim xTtl As Double

Application.Volatile

If ColumnOffset = 0 Or IsMissing(Criteria) Then
    For Each xCell In SumRange
        If xCell.ColumnWidth > 0 And -
           xCell.RowHeight > 0 And -
           Not IsEmpty(xCell) And -
           IsNumeric(xCell.Value) Then
            xTtl = xTtl + xCell.Value
        End If
    Next
Else
    For Each xCell In SumRange
        If xCell.ColumnWidth > 0 And -
           xCell.RowHeight > 0 And -
           Not IsEmpty(xCell) And -
           IsNumeric(xCell.Value) And -
           xCell.Offset(, ColumnOffset).Value <> Criteria
           And -
           xCell.Offset(, ColumnOffset2).Value <> Criteria2
    
```

```
And _
xCell.Offset(, ColumnOffset4).Value <> Criteria4
And _
xCell.Offset(, ColumnOffset3).Value = Criteria3
Then
    xTtl = xTtl + xCell.Value
End If
Next
End If
Sumvisible3 = xTtl
End Function
```

Annex F - *AverVisible () Function*

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Function AverVisible(Rg As Range)

    Dim xCell As Range
    Dim xCount As Integer
    Dim xTtl As Double

    Application.Volatile

    Set Rg = Intersect(Rg.Parent.UsedRange, Rg)

    For Each xCell In Rg
        If xCell.ColumnWidth > 0 -
            And xCell.RowHeight > 0 -
            And Not IsEmpty(xCell) -
            And IsNumeric(xCell.Value) Then
                xTtl = xTtl + xCell.Value
                xCount = xCount + 1
        End If
    Next

    If xCount > 0 Then
        AverVisible = xTtl / xCount
    End If
End Function
```

```
Else
    AverVisible = 0
End If
End Function
```

Annex G - *Adicionar Venda*

UserForm code

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Private Sub UserForm_Initialize()  
  
'''''' Preencher IDbox ''''''  
  
    With ThisWorkbook.Sheets("Vendas")  
        Me.IDBox.Value = .Range("A" &  
            Rows.Count).End(xlUp).Value + 1  
    End With  
  
'''''' Preencher com os fornecedores/ clientes ''''''  
  
    Dim Y As Long  
    Dim f As Long  
    Dim forn As Worksheet  
  
    Set forn = ThisWorkbook.Sheets("Forn_Clientes")  
  
    f = forn.Range("A" & Application.Rows.Count).End(xlUp).Row
```

```

For Y = 2 To f
With ThisWorkbook.Sheets("Forn_Clientes")
    Me.FornClieBox.AddItem CStr(forn.Cells(Y, 1))
End With
Next Y

'''''' Preencher com os produtos ''''''

Dim i As Long
Dim n As Long
Dim sh As Worksheet

Set sh = ThisWorkbook.Sheets("Produtos")

n = sh.Range("A" & Application.Rows.Count).End(xlUp).Row

For i = 2 To n
With ThisWorkbook.Sheets("Produtos")
    Me.ProdutoBox.AddItem CStr(sh.Cells(i, 1))
End With
Next i

'''''' Preencher com o responsavel ''''''

Dim r As Long
Dim m As Long
Dim sr As Worksheet

Set sr = ThisWorkbook.Sheets("áResponsvel")

m = sr.Range("A" & Application.Rows.Count).End(xlUp).Row

For r = 2 To m
With ThisWorkbook.Sheets("áResponsvel")

```

```

        Me.RespBox.AddItem CStr(sr.Cells(r, 1))
    End With
    Next r

End Sub

Private Sub UserForm_Activate()

    DatePicker.Value = Format(Date, "dd/mm/yyyy")
    StartDatePicker.Value = Format(Date, "dd/mm/yyyy")
    DueDatePicker.Value = Format(Date, "dd/mm/yyyy")

End Sub

Private Sub LimparButton_Click()

Me.ProcessoBox.Value = ""
Me.FornClienBox.Value = ""
Me.ProdutoBox.Value = ""
Me.QuantBox.Value = ""
Me.PrecoBox.Value = ""
Me.MargemBox.Value = ""
Me.RespBox.Value = ""
Me.CompraButton.Value = False
Me.VendaButton.Value = False
Me.CTButton.Value = False
Me.VTButton.Value = False
Me.DataPicker = Format(Date, "dd/mm/yyyy")
Me.StartDatePicker = Format(Date, "dd/mm/yyyy")
Me.DueDatePicker = Format(Date, "dd/mm/yyyy")
Me.IDBox.Value = ThisWorkbook.Sheets("Vendas").Range("A" &
Rows.Count).End(xlUp).Value + 1

End Sub

```

```
Private Sub SairButton_Click()
```

```
    Unload Me
```

```
End Sub
```

```
Private Sub AdicionarButton_Click()
```

```
'''''''''''''' Validacao dos dados ''''''''''''''
```

```
    If VBA.IsNumeric(Me.QuantBox.Value) = False Then
```

```
        MsgBox "Por favor insira uma quantidade válida  
(énumrico)", vbCritical
```

```
        Exit Sub
```

```
    End If
```

```
    If VBA.IsNumeric(Me.PrecoBox.Value) = False Then
```

```
        MsgBox "Por favor insira um preço válido (énumrico)",  
        vbCritical
```

```
        Exit Sub
```

```
    End If
```

```
    If VBA.IsNumeric(Me.MargemBox.Value) = False Then
```

```
        MsgBox "Por favor insira uma margem áunitria válida  
(énumrico)", vbCritical
```

```
        Exit Sub
```

```
    End If
```

```
    If Me.FornClienBox.Value = "" Then
```

```
        MsgBox "Por favor insira um fornecedor ou cliente",  
        vbCritical
```

```
        Exit Sub
```

```
    End If
```

```
    If Me.ProcessoBox.Value = "" Then
```

```

    MsgBox "Por favor insira o processo", vbCritical
    Exit Sub
End If

If Me.CompraButton.Value = False And _
    Me.VendaButton.Value = False And _
    Me.VTButton.Value = False And _
    Me.CTButton.Value = False Then
    MsgBox "Por favor indique o tipo de çãtransao",
    vbCritical
    Exit Sub
End If

If Me.DataPicker.Value = False Then
    MsgBox "Por favor indique a data de çlanamento da
    venda", vbCritical
    Exit Sub
End If

If Me.StartDatePicker.Value = False Then
    MsgBox "Por favor indique a data de íncio da
    entrega", vbCritical
    Exit Sub
End If

If Me.DueDatePicker.Value = False Then
    MsgBox "Por favor indique a data de fim da entrega",
    vbCritical
    Exit Sub
End If

If Me.RespBox.Value = "" Then
    MsgBox "Por favor selecione o áresponsvel pela venda",
    vbCritical

```

```

        Exit Sub
    End If

    '''''''' Verificacao de duplicados ''''''''

Dim sh As Worksheet
Set sh = ThisWorkbook.Sheets("Vendas")
Dim n As Long

    If Application.WorksheetFunction.CountIf(sh.Range("A:A"),
Me.IDBox.Value) > 0 Then
        MsgBox "Este ID já está atribuido a outra venda. Por
        favor confirme se a informação está duplicada",
        vbCritical
    Exit Sub
    End If

    '''''''' Inserir/verificar ultima linha utilizada ''''''''

n = sh.Range("A" & Application.Rows.Count).End(xlUp).Row
sh.Range("H" & n + 1).Value = CVar(Me.QuantBox.Value)
sh.Range("L" & n + 1).Value = CCur(Me.PrecoBox.Value)
sh.Range("M" & n + 1).Value = CCur(Me.MargemBox.Value)
sh.Range("A" & n + 1).Value = CLng(Me.IDBox.Value)
sh.Range("D" & n + 1).Value = Me.ProcessoBox.Value
sh.Range("E" & n + 1).Value = Me.FornClienBox.Value
sh.Range("G" & n + 1).Value = Me.ProdutoBox.Value
sh.Range("B" & n + 1).Value = Format(Me.DataPicker.Value,
"mm/dd/yyyy")
sh.Range("I" & n + 1).Value = Format(Me.StartDatePicker.Value,
"mmm/yyyy")
sh.Range("J" & n + 1).Value = Format(Me.DueDatePicker.Value,
"mmm/yyyy")
sh.Range("P" & n + 1).Value = Me.RespBox.Value

```

```

If Me.CompraButton.Value = True Then
    sh.Range("F" & n + 1).Value = "C"
End If

If Me.VendaButton.Value = True Then
    sh.Range("F" & n + 1).Value = "V"
End If

If Me.CTButton.Value = True Then
    sh.Range("F" & n + 1).Value = "CT"
End If

If Me.VTButton.Value = True Then
    sh.Range("F" & n + 1).Value = "VT"
End If

'''''' Limpar caixas ''''''

Me.ProcessoBox.Value = ""
Me.FornClienBox.Value = ""
Me.ProdutoBox.Value = ""
Me.QuantBox.Value = ""
Me.PrecoBox.Value = ""
Me.MargemBox.Value = ""
Me.RespBox.Value = ""

Me.CompraButton.Value = False
Me.VendaButton.Value = False
Me.CTButton.Value = False
Me.VTButton.Value = False

Me.DataPicker = Format(Date, "dd/mm/yyyy")
Me.StartDatePicker = Format(Date, "dd/mm/yyyy")

```

```
Me.DueDatePicker = Format(Date, "dd/mm/yyyy")

Me.IDBox.Value = ThisWorkbook.Sheets("Vendas").Range("A" &
Rows.Count).End(xlUp).Value + 1

MsgBox "Foi adicionado uma nova venda", vbInformation

End Sub
```

Annex H - *Corrigir Venda*

UserForm code

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Private Sub UserForm_Activate ()

'''''''' Adicionar drop-down list para o ID da venda ''''''''

Dim sh As Worksheet
Set sh = ThisWorkbook.Sheets("Vendas")

Dim i As Integer
Me.IDBox.Clear
Me.IDBox.AddItem ""

    For i = 2 To sh.Range("A" &
Application.Rows.Count).End(xlUp).Row
        Me.IDBox.AddItem sh.Range("A" & i).Value
    Next i

DatePicker.Value = Format(Date, "dd/mm/yyyy")
StartDatePicker.Value = Format(Date, "dd/mm/yyyy")
DueDatePicker.Value = Format(Date, "dd/mm/yyyy")
```

```
End Sub
```

```
Private Sub UserForm_Initialize()
```

```
'''''' Adicionar lista dos fornecedores/ clientes ''''''
```

```
Dim Y As Long
```

```
Dim f As Long
```

```
Dim forn As Worksheet
```

```
Set forn = ThisWorkbook.Sheets("Forn_Clientes")
```

```
f = forn.Range("A" & Application.Rows.Count).End(xlUp).Row
```

```
For Y = 2 To f
```

```
With ThisWorkbook.Sheets("Forn_Clientes")
```

```
Me.FornClienBox.AddItem CStr(forn.Cells(Y, 1))
```

```
End With
```

```
Next Y
```

```
End Sub
```

```
Private Sub LimparButton_Click()
```

```
Me.ProcessoBox.Value = ""
```

```
Me.FornClienBox.Value = ""
```

```
Me.ProdutoBox.Value = ""
```

```
Me.QuantBox.Value = ""
```

```
Me.PrecoBox.Value = ""
```

```
Me.MargemBox.Value = ""
```

```
Me.RespBox.Value = ""
```

```
Me.CompraButton.Value = False
```

```

Me.VendaButton.Value = False
Me.CTButton.Value = False
Me.VTButton.Value = False

Me.DataPicker = Format(Date, "dd/mm/yyyy")
Me.StartDatePicker = Format(Date, "dd/mm/yyyy")
Me.DueDatePicker = Format(Date, "dd/mm/yyyy")

Me.IDBox.Value = ""

End Sub

Private Sub IDBox_Change()

'''''''' Look up da informacao da venda selecionada ''''''''

If Me.IDBox.Value <> "" Then

    Dim sh As Worksheet
    Set sh = ThisWorkbook.Sheets("Vendas")
    Dim i As Integer

    i = Application.Match(VBA.CLng(Me.IDBox.Value),
    sh.Range("A:A"), 0)

    Me.ProcessoBox.Value = sh.Range("D" & i).Value
    Me.FornClienBox.Value = sh.Range("E" & i).Value
    Me.ProdutoBox.Value = sh.Range("G" & i).Value
    Me.DataPicker.Value = Format(sh.Range("B" & i).Value,
    "dd/mm/yyyy")
    Me.StartDatePicker.Value = Format(sh.Range("I" & i).Value,
    "dd/mm/yyyy")
    Me.DueDatePicker.Value = Format(sh.Range("J" & i).Value,

```



```
If VBA.IsNumeric(Me.PrecoBox.Value) = False Then
    MsgBox "Por favor insira um preço válido (numérico)",
        vbCritical
    Exit Sub
End If
```

```
If VBA.IsNumeric(Me.MargemBox.Value) = False Then
    MsgBox "Por favor insira uma margem unitária válida
    (numérico)", vbCritical
    Exit Sub
End If
```

```
If Me.FornClienBox.Value = "" Then
    MsgBox "Por favor insira um fornecedor ou cliente",
        vbCritical
    Exit Sub
End If
```

```
If Me.ProcessoBox.Value = "" Then
    MsgBox "Por favor insira o processo", vbCritical
    Exit Sub
End If
```

```
If Me.CompraButton.Value = False And _
    Me.VendaButton.Value = False And _
    Me.VTButton.Value = False And _
    Me.CTButton.Value = False Then
    MsgBox "Por favor indique o tipo de transação",
        vbCritical
    Exit Sub
End If
```

```

If Me.DataPicker.Value = False Then
    MsgBox "Por favor indique a data de çlanamento da
venda", vbCritical
    Exit Sub
End If

If Me.StartDatePicker.Value = False Then
    MsgBox "Por favor indique a data de íncio da
entrega", vbCritical
    Exit Sub
End If

If Me.DueDatePicker.Value = False Then
    MsgBox "Por favor indique a data de fim da entrega",
vbCritical
    Exit Sub
End If

If Me.RespBox.Value = "" Then
    MsgBox "Por favor selecione o áresponsvel pela venda",
vbCritical
    Exit Sub
End If

'''''''''''''' Inserir/verificar ultima coluna ''''''''''''''

Dim sh As Worksheet
Set sh = ThisWorkbook.Sheets("Vendas")
Dim n As Long

n = Application.Match(VBA.CLng(Me.IDBox.Value),
sh.Range("A:A"), 0)

```

```

sh.Range("H" & n).Value = CVar(Me.QuantBox.Value)
sh.Range("L" & n).Value = CCur(Me.PrecoBox.Value)
sh.Range("M" & n).Value = CCur(Me.MargemBox.Value)
sh.Range("A" & n).Value = CLng(Me.IDBox.Value)
sh.Range("D" & n).Value = Me.ProcessoBox.Value
sh.Range("E" & n).Value = Me.FornClienBox.Value
sh.Range("G" & n).Value = Me.ProdutoBox.Value
sh.Range("B" & n).Value = Me.DataPicker.Value
sh.Range("I" & n).Value = Format(Me.StartDatePicker.Value,
"mmm/yyyy")
sh.Range("J" & n).Value = Format(Me.DueDatePicker.Value,
"mmm/yyyy")
sh.Range("P" & n).Value = Me.RespBox.Value

```

```

If Me.CompraButton.Value = True Then

```

```

    sh.Range("F" & n).Value = "C"

```

```

End If

```

```

If Me.VendaButton.Value = True Then

```

```

    sh.Range("F" & n).Value = "V"

```

```

End If

```

```

If Me.CTButton.Value = True Then

```

```

    sh.Range("F" & n).Value = "CT"

```

```

End If

```

```

If Me.VTButton.Value = True Then

```

```

    sh.Range("F" & n).Value = "VT"

```

```

End If

```

```

'''''' Limpas caixas ''''''

```

```

Me.ProcessoBox.Value = ""

```

```

Me.FornClienBox.Value = ""
Me.ProdutoBox.Value = ""
Me.QuantBox.Value = ""
Me.PrecoBox.Value = ""
Me.MargemBox.Value = ""
Me.RespBox.Value = ""

Me.CompraButton.Value = False
Me.VendaButton.Value = False
Me.CTButton.Value = False
Me.VTButton.Value = False

Me.DataPicker = Format(Date, "dd/mm/yyyy")
Me.StartDatePicker = Format(Date, "dd/mm/yyyy")
Me.DueDatePicker = Format(Date, "dd/mm/yyyy")

Me.IDBox.Value = ""

MsgBox "A venda foi atualizada", vbInformation

End Sub

Private Sub ApagarButton_Click()

'''''''' Apagar a linha selecionada ''''''''

Dim sh As Worksheet
Set sh = ThisWorkbook.Sheets("Vendas")

Dim n As Long
n = Application.Match(VBA.CLng(Me.IDBox.Value),
sh.Range("A:A"), 0) - 1

Dim tbl As ListObject

```

```

Set tbl = sh.ListObjects("VendasTot")

tbl.Range.AutoFilter Field:=1, Criteria1:=n

Application.DisplayAlerts = False

tbl.DataBodyRange.SpecialCells(xlCellTypeVisible).Delete

tbl.AutoFilter.ShowAllData

''''''''Reset dos valores do áformulario''''''''

Me.ProcessoBox.Value = ""
Me.FornClienBox.Value = ""
Me.ProdutoBox.Value = ""
Me.QuantBox.Value = ""
Me.PrecoBox.Value = ""
Me.MargemBox.Value = ""
Me.RespBox.Value = ""
Me.CompraButton.Value = False
Me.VendaButton.Value = False
Me.CTButton.Value = False
Me.VTButton.Value = False
Me.DatePicker = Format(Date, "dd/mm/yyyy")
Me.StartDatePicker = Format(Date, "dd/mm/yyyy")
Me.DueDatePicker = Format(Date, "dd/mm/yyyy")
Me.IDBox.Value = ""

MsgBox "A venda foi apagada", vbInformation
End Sub

Private Sub SairButton_Click()
Unload Me
End Sub

```

Annex I - *RAR logo macro*

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Sub Picture7_Click ()

Application.ScreenUpdating = False
Application.EnableEvents = False

ActiveWorkbook.Connections("Query –
Ano").OLEDBConnection.Refresh
ActiveWorkbook.Connections("Query – Forn/
Clientes").OLEDBConnection.Refresh
ActiveWorkbook.Connections("Query –ã
Previso_Entregas").OLEDBConnection.Refresh
ActiveWorkbook.Connections("Query –ã
Previso_Margem").OLEDBConnection.Refresh
ActiveWorkbook.Connections("Query –
Produtos").OLEDBConnection.Refresh
ActiveWorkbook.Connections("Query –á
Responsvel").OLEDBConnection.Refresh

Dim PT As PivotTable
Dim WS As Worksheet
```

```
For Each WS In ThisWorkbook.Worksheets

    For Each PT In WS.PivotTables
        PT.RefreshTable
    Next PT
Next WS

Application.ScreenUpdating = True
Application.EnableEvents = True

End Sub
```

Annex J - VBA code on "Inserir Venda" sheet

In the following code, special Portuguese symbols may have distorted some words, while uploading it to LaTeX.

```
Private Sub AdicionarButton_Click()  
AdicionarVenda.Show  
End Sub  
  
Private Sub AnoBox_Change()  
Dim wr As Worksheet  
Set wr = ThisWorkbook.Sheets("óRelatrio")  
  
wr.Range("C18").Select  
    With Selection  
        Selection.NumberFormat = "General"  
        .Value = .Value  
    End With  
End Sub  
  
Private Sub CorrigirButton_Click()  
CorrigirForm.Show  
End Sub
```

```

Private Sub FiltrarButton_Click()
Dim WS As Worksheet
Set WS = ThisWorkbook.Sheets("Vendas")
Dim wr As Worksheet
Set wr = ThisWorkbook.Sheets("óRelatrio")

WS.AutoFilterMode = False

If wr.Cells(14, 3).Value <> "" Then
WS.UsedRange.AutoFilter Field:=7, Criteria1:=wr.Cells(14,
3).Value
End If
If wr.Cells(16, 3).Value <> "" Then
WS.UsedRange.AutoFilter Field:=16, Criteria1:=wr.Cells(16,
3).Value
End If
If wr.Cells(18, 3).Value <> "" Then
WS.UsedRange.AutoFilter Field:=3, Criteria1:=wr.Cells(18,
3).Value
End If
End Sub

Private Sub LimparButton_Click()
Dim WS As Worksheet
Set WS = ThisWorkbook.Sheets("Vendas")
Dim lo As ListObject
Set lo = WS.ListObjects("VendasTot")

ProdutoBox.Value = ""
RespBox.Value = ""
AnoBox.Value = Year(Date)
lo.AutoFilter.ShowAllData
End Sub

```

**Annex K - *Google Form* for TD
regarding the previous file**

Acembex - Ficheiro de tesouraria atual

O presente questionário tem como objetivo compreender o tempo necessário para preencher os atuais ficheiros de confirmings, necessidades de atividade, utilização média mensal e mapa de financiamento semanal.

É um questionário de resposta rápida e anónima.

Por favor indique o tempo que utiliza, por exemplo, 5 minutos ou 20 segundos.

Obrigado pela sua colaboração!

*Obrigatório

1. Em média e numa base diária, quanto tempo utiliza para manter o ficheiro dos confirmings atual? *

2. Em média, quanto tempo utiliza para eliminar um confirming no ficheiro atual de confirmings? *

3. Em média, quanto tempo utiliza para atualizar ou corrigir um confirming no ficheiro atual de confirmings? *

4. Em média, quanto tempo utiliza para procurar confirmings específicos no ficheiro atual de confirmings? *

5. Em média, quanto tempo utiliza para preencher um novo confirming no ficheiro da utilização média mensal? *

6. Em média, quanto tempo utiliza por dia para manter o ficheiro da utilização média mensal? *

7. Em média, quanto tempo utiliza por dia para manter o mapa de financiamento atualizado? *

8. Quanto tempo utiliza, em média, para preencher o ficheiro atual das necessidades de atividade numa base diária? *

9. Em média, quanto tempo requer o preenchimento de um novo confirming em todos os ficheiros (ficheiros dos confirmings, utilização média mensal, planeamento, etc)? *

10. Em média, quanto tempo espera poder vir a ser economizado com o novo sistema? *

Este conteúdo não foi criado nem aprovado pela Google.

Google Formulários

**Annex L - *Google Form* for TD
regarding the new file**

Acembex - Ficheiro de tesouraria novo

O presente questionário tem como objetivo compreender o tempo necessário para preencher os novos ficheiros de confirmings e ficheiros anual e agregado.

É um questionário de resposta rápida e anónima.

Por favor indique o tempo que utiliza, por exemplo, 5 minutos ou 20 segundos.

Obrigado pela sua colaboração e tempo dispendido!

***Obrigatório**

Ficheiro confirmings

1. Em média, quanto tempo utiliza para preencher um confirming no ficheiro novo de confirmings? *

2. Em média, quanto tempo utiliza para eliminar um confirming no ficheiro novo de confirmings? *

3. Em média, quanto tempo utiliza para atualizar ou corrigir um confirming no ficheiro novo de confirmings? *

4. Em média, quanto tempo utiliza para procurar confirmings específicos no ficheiro novo de confirmings? *

5. De um a dez, quão prático considera o novo ficheiro dos confirmings? *

Marcar apenas uma oval.

1 2 3 4 5 6 7 8 9 10

Pouco prático Muito prático

6. De um a dez, quão visualmente atrativo considera o novo ficheiro dos confirmings? *

Marcar apenas uma oval.

1 2 3 4 5 6 7 8 9 10

Pouco atrativo Muito atrativo

7. Em média, quanto tempo considera que é economizado na procura de confirmings específicos no novo ficheiro (navegação num só ficheiro versus navegação entre vários ficheiros e separadores)? *

8. Em média e no geral, quanto tempo considera que foi economizado com o novo ficheiro de confirmings numa base diária? *

Ferramenta de otimização

9. De um a dez, quão fiável considera a ferramenta de otimização? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco fiável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito fiável

10. De um a dez, quão útil considera a ferramenta de otimização? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco útil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito útil

11. Em média, quanto tempo considera que foi economizado no processo de tomada de decisão com a ferramenta de otimização? *

Utilização média mensal

12. De um a dez, quão fiável considera a automatização da utilização média mensal? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco fiável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito fiável

13. De um a dez, quão útil considera a automatização da utilização média mensal? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco útil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito útil

14. De um a dez, quão prática considera a nova organização da utilização média mensal (navegação num só ficheiro versus navegação entre vários ficheiros e separadores)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco prático	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito prático

15. De um a dez, quão visualmente atrativa considera a nova organização da utilização média mensal (navegação num só ficheiro versus navegação entre vários ficheiros e separadores)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco atrativa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito atrativa

16. De um a dez, quão fiável considera o sistema automatizado de preenchimento da utilização média mensal? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco fiável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito fiável

17. De um a dez, quão fiável considera o sistema manual de preenchimento da utilização média mensal? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco fiável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito fiável

Geral

18. De um a dez, quão prático considera o sistema implementado de um ficheiro agregado e um anual? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco prático	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito prático

19. De um a dez, quão fiável considera o sistema implementado de um ficheiro agregado e um anual? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco fiável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito fiável

20. Considera necessária a divisão em dois ficheiros, um mais leve e outro mais pesado? *

Marcar apenas uma oval.

- Sim
 Não
 Indiferente

21. De um a dez, como avaliaria a performance de todo o sistema (ficheiro dos confirmings e ficheiros anual e agregado)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Fraco	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

22. Em média e numa base diária, quanto tempo considera que foi economizado com todo o sistema implementado? *

23. De um a dez, quão prático considera a automatização do preenchimento do "factoring" e "OT" nos ficheiros anual e agregado? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco prático	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito prático

24. De um a dez, quão fiável considera a automatização do preenchimento do "factoring" e "OT" nos ficheiros anual e agregado nos seus respetivos separadores? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco fiável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito fiável

25. De um a dez, quão prático considera o preenchimento do "factoring" e "OT" no separador das necessidades de atividade? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco prático	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito prático

Necessidades de financiamento

26. De um a dez, quão prático considera a nova organização das necessidades de financiamento (navegação num só ficheiro versus navegação entre vários ficheiros e separadores)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco prático	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito prático

27. De um a dez, quão visualmente atrativo considera a nova organização das necessidades de financiamento? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco atrativo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito atrativo

28. Quanto tempo utiliza, em média e numa base diária, para preencher o novo ficheiro das necessidades de financiamento, tendo em conta que apenas necessita de preencher o "factoring" e "OT"? *

29. De um a dez, quão mais simples considera a navegação nas necessidades de financiamento numa só folha versus a navegação convencional entre ficheiros e separadores? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco simples	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito simples

30. De um a dez, quão visualmente atrativo considera a nova organização do "factoring"? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco atrativo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito atrativo

31. De um a dez, quão visualmente atrativo considera a nova organização do "OT"? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco atrativo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito atrativo

Ficheiro Word

32. De um a dez, quão útil considera o ficheiro Word com os procedimentos de tesouraria? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco útil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito útil

33. De um a dez, quão bem estruturado e simples considera o ficheiro Word com os procedimentos de tesouraria? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Mal estruturado e complicado	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito bem estruturado e simples

Avaliação Geral

34. Como avalia a estruturação dos ficheiros (qualidade da estrutura em termos de número de ficheiros, folhas por documentos, organização do documento, entre outros)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

35. Como avalia a dimensão dos ficheiros (ficheiros com tabelas demasiado extensas ou demasiado curtas)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

36. Como avalia a suporte visual dos ficheiros (existência de ajudas visuais como gráficos, figuras, tabelas, entre outros)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

37. Como avalia a capacidade de atualização dos ficheiros (os ficheiros atualizam-se de forma correta)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

38. Como avalia a legibilidade dos ficheiros (frases, tabelas e figuras transmitem ideias claras e compreensíveis)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

39. Como avalia o grau de acabamento dos ficheiros (documentos descrevem todas os pontos da realidade e necessários de serem abordados)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssimo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

40. Como avalia a praticidade dos ficheiros (usabilidade dos ficheiros no geral)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

41. Como avalia a adaptabilidade dos ficheiros as necessidades diárias da empresa? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

42. Como avalia a substituíbilidade dos ficheiros (possibilidade de aparecimento de ferramentas que os tornem obsoletos)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco provável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito provável

43. Como avalia a capacidade de migração de informação dos ficheiros (uso da informação noutras plataformas)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

44. Como avalia a interoperabilidade dos ficheiros (capacidade de vários ficheiros "comunicarem" entre si)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

45. Como avalia a configuração dos ficheiros (facilidade/dificuldade de abertura em diferentes dispositivos)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

46. Como avalia a capacidade de personalização dos ficheiros (facilidade/dificuldade de modificar os mesmos conforme o aparecimento de novas necessidades)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

Este conteúdo não foi criado nem aprovado pela Google.

Google Formulários

**Annex M - *Google Form* for CD
regarding the previous file**

Acembex - Ficheiro de Vendas Diárias Atual

O presente questionário tem como objetivo compreender o tempo necessário para preencher o ficheiro das vendas anterior, potenciais limitações e expectativas sobre o ficheiro que tenho vindo a desenvolver nos últimos meses.

É um questionário de resposta rápida e anónima.

Por favor indique o tempo que utiliza, por exemplo, 5 minutos ou 20 segundos.

Obrigado pela sua colaboração!

***Obrigatório**

1. Em média e numa base diária, quanto tempo utiliza para manter o ficheiro das vendas atual? *

2. Em média, quanto tempo utiliza para eliminar uma venda no ficheiro atual? *

3. Em média, quanto tempo utiliza para atualizar ou corrigir uma venda no ficheiro atual de vendas? *

4. Em média, quanto tempo utiliza para procurar vendas específicas no ficheiro atual? *

5. Em média, quanto tempo utiliza para preencher uma nova venda? *

6. Quais as principais limitações que encontra no atual ficheiro? *

7. Como avalia a estruturação do ficheiro atual (qualidade da estrutura em termos de número de ficheiros, folhas por documento, organização do documento, entre outros)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

8. Como avalia a dimensão do ficheiro atual (ficheiro com tabelas demasiado extensas ou demasiado curtas)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

9. Como avalia a suporte visual do ficheiro atual (existência de ajudas visuais como gráficos, figuras, tabelas, entre outros)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

10. Como avalia a facilidade de atualização dos ficheiros?

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

11. Como avalia a legibilidade do ficheiro atual (as tabelas transmitem ideias claras e compreensíveis)?

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

12. Como avalia o grau de acabamento do ficheiro atual (documento descreve todos os pontos da realidade e que tem de ser abordados)?

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssimo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

13. Como avalia a praticidade do ficheiro atual (grau de usabilidade do ficheiro no geral)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Nada prático	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremamente prático

14. Como avalia a adaptabilidade do ficheiro atual às necessidades diárias da empresa? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

15. Como avalia a substituíbilidade do ficheiro atual (possibilidade de aparecimento de ferramentas que o torne obsoleto)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco provável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito provável

16. Como avalia a capacidade de migração de informação do ficheiro atual (uso da informação noutras plataformas)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

17. Como avalia a interoperabilidade do ficheiro (capacidade deste poder vir a "comunicar" com vários ficheiros)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

18. Como avalia a configuração do ficheiro atual (facilidade/dificuldade de abertura em diferentes dispositivos)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

19. Como avalia a capacidade de personalização do ficheiro atual (facilidade/dificuldade de modificar o mesmo conforme o aparecimento de novas necessidades)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

20. De um a dez, quão útil e necessário considera a implementação de uma nova ferramenta que permita a rápida e fácil visualização de informação? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Nada útil e necessário	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremamente útil e necessário

Este conteúdo não foi criado nem aprovado pela Google.

Google Formulários

**Annex N - *Google Form* for CD
regarding the new file**

Acembex - Ficheiro de Vendas Diárias Novo

O presente questionário tem como objetivo compreender o tempo necessário para preencher e utilizar o ficheiro novo de vendas, potenciais limitações e expectativas.

É um questionário de resposta rápida e anónima.

Por favor indique o tempo que utiliza, por exemplo, 5 minutos ou 20 segundos.

Obrigado pela sua colaboração!

***Obrigatório**

1. Em média e numa base diária, quanto tempo utiliza para manter atualizado o novo ficheiro das vendas? *

2. Em média, quanto tempo utiliza para eliminar uma venda no ficheiro novo? *

3. Em média, quanto tempo utiliza para atualizar ou corrigir uma venda no novo ficheiro de vendas? *

4. Em média, quanto tempo utiliza para procurar vendas específicas no novo ficheiro? *

5. Em média, quanto tempo utiliza para preencher uma nova venda? *

6. Em média, quanto tempo considera que possa ter sido economizado com o novo sistema? *

7. Quais as principais limitações que encontra no novo ficheiro? *

8. De um a dez, quão visualmente atrativo considera o novo ficheiro? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco atrativo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito atrativo

9. De um a dez, quão fiável considera o novo ficheiro? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco fiável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito fiável

10. De um a dez, como avaliaria a performance de todo o sistema (dashboard, relatório, Userform para introduzir a venda, objetivos e tabela das vendas)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Fraco	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

Ficheiro Word

11. De um a dez, quão útil considera o ficheiro Word com os procedimentos? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco útil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito útil

12. De um a dez, quão bem estruturado e simples considera o ficheiro Word com os procedimentos? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Mal estruturado e complicado	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito bem estruturado e simples

Avaliação Geral

13. Como avalia a estruturação dos ficheiros (qualidade da estrutura em termos de número de ficheiros, folhas por documentos, organização do documento, entre outros)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

14. Como avalia a dimensão dos ficheiros (ficheiros com tabelas demasiado extensas ou demasiado curtas)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

15. Como avalia a suporte visual dos ficheiros (existência de ajudas visuais como gráficos, figuras, tabelas, entre outros)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

16. Como avalia a capacidade de atualização dos ficheiros (os ficheiros atualizam-se de forma correta)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

17. Como avalia a legibilidade dos ficheiros (frases, tabelas e figuras transmitem ideias claras e compreensíveis)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

18. Como avalia o grau de acabamento dos ficheiros (documentos descrevem todos os pontos da realidade e necessários de ser abordados)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssimo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

19. Como avalia a praticidade dos ficheiros (usabilidade dos ficheiros no geral)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

20. Como avalia a adaptabilidade dos ficheiros às necessidades diárias da empresa? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

21. Como avalia a substituíbilidade dos ficheiros (possibilidade de aparecimento de ferramentas que os tornem obsoletos)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Pouco provável	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muito provável

22. Como avalia a capacidade de migração de informação dos ficheiros (uso da informação noutras plataformas)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

23. Como avalia a interoperabilidade do ficheiro (capacidade deste poder vir a "comunicar" com vários ficheiros)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

24. Como avalia a configuração dos ficheiros (facilidade/dificuldade de abertura em diferentes dispositivos)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

25. Como avalia a capacidade de personalização dos ficheiros (facilidade/dificuldade de modificar os mesmos conforme o aparecimento de novas necessidades)? *

Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	10	
Péssima	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

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