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**A Method for KPI Selection and Dashboard Design applied in a Book  
Editor**

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## **Abstract**

The selection of the most relevant Key Performance Indicators (KPIs), their visual representation and its implementation define the effectiveness of an organization's Performance Measurement Systems (PMSs). Knowing this, a concrete method is required to guide the process in order to achieve the most adequate PMS that systematizes and enhances the intuitive monitoring and decision making to improve performance.

This dissertation tackles the development of this method and its application which was done through a review of state-of-the-art literature and by employing the most applicable and regarded methods and tools. To apply, test, and improve the method different types of research were necessary, like quantitative and qualitative research. The end product is a method that can be applied, continuously improved, and adapted for many types of organizations.

The method was applied in a real organizational context, a book editing and retail company, more specifically, in its editorial segment. The objective was to validate the method through its employment for the selection of the most important KPIs for this segment of the organization, and the design of a dashboard for the selected KPI's analysis. Through this, improvements to the segment's PMSs and data analysis capabilities were made, while also correcting and improving upon the method.

## **Resumo**

Esta dissertação aborda o desenvolvimento de um método para selecionar os Indicadores-Chave de Desempenho (KPIs) mais relevantes para uma organização, a sua representação visual e a sua implementação, de forma a melhorar os seus Sistemas de Medição de Desempenho (PMSs). O método foi desenvolvido através de uma revisão da literatura atualizada e da aplicação dos métodos e ferramentas sugeridos e adequados. Foram realizadas pesquisas quantitativas e qualitativas para aplicar, testar e aprimorar o método, que pode ser utilizado e adaptado para diferentes tipos de organizações. O método foi aplicado numa empresa de edição e retalho de livros, especificamente no seu segmento editorial, resultando em melhorias no seu PMS e nas suas capacidades de análise de dados, além de correções e aprimoramentos no próprio método.

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## List of abbreviations

APEL - Associação Portuguesa de Editores e Livreiros  
B2B - Business to Business  
B2C - Business to Client  
BPM - Business Performance Management cycle  
CAGR - Compound Annual Growth Rate  
Covid-19 - Coronavirus Disease 2019  
CRM - Customer Resource Management  
DSR - Design Science Research  
EAM - Enterprise Analysis Model  
ERP - Enterprise Resource Planning  
ETL - Consolidation Program  
EU - European Union  
EIBF - European and International Nooksellers Federation  
ISBN - International Standard Book Number  
IT - Information Technology  
ITIL - Information Technology Infrastructure Library  
KPI - Key Performance Indicator  
KPIs - Key Performance Indicators  
KRI - Key Result Indicator  
KRIs - Key Result Indicators  
MP - Management Program  
NPS - Net Promoter Score  
PMS - Performance Measurement System  
PMSs - Performance Measurement Systems  
PwC - PricewaterhouseCoopers  
R&D - Research and Development  
S. A. - Anonymous Society  
SMART - Specific, Measurable, Attainable, Relevant, and Timely  
UK - United Kingdom  
USD - United States Dollar

## 1 Introduction

### 1.1 Context and Motivation

Strategic systems are established as highly determinant to organizations' success, with the likes of executive information and PMSs supporting decision making by providing knowledge on their configuration and management (Chytas et al., 2011). According to Ellingrud (2022), there is a lack of productivity growth, and the main takeaway is that not only is there a need for productivity increases, but there is also room to overtake competition in this matter. That is especially true since in today's industry where all operations are IT-based, organizations' PMSs need to have fast reactive capabilities, be predictive and provide real-time control (Setiawan & Purba, 2020). Meanwhile, growth efforts, according to Gartner (*CEOs Newly Focus on Workforce and Sustainability in 2022- 23, 2022.*) the major focus of organizations, should not be placed only on strengths and differentiators, weaknesses and other factors must be spotted to establish a coherent performance (Kokina et al., 2017). Moreover, these PMSs and the measurements they choose to employ must be constantly evaluated and adapted to not get outdated (Cai et al., 2009).

To assess performance through PMSs, organizations need to first obtain the knowledge that sets them apart from the competition, so they turn to data. McKinsey (*Five Fifty: The Data Disconnect, 2022*) claims that data is abundant, and its potential to increase knowledge that can directly improve productivity, quality of information and communication, is increasing. However, according to the author, there is a data disconnect, and it is paramount to educate executives and managers on finding the most efficient ways to select useful data, organize and structure it, thus monetizing it.

PMSs employ Key Performance Indicators (KPIs), which are “a management tool or instrument so that an activity or process can be followed, controlled (...), and ensured to achieve the desired performance” (Setiawan & Purba, 2020). Management needs to select the performance indicators they value as key, and assure that they are aligned with the organizational strategy, they need to measure and assess its implementation (Setiawan & Purba, 2020), and provide benchmarking information against relevant peer groups (PricewaterhouseCoopers, 2007).

To visualise and interact with this information, dashboards or performance dashboards are employed. Dashboards are defined as “a visual and interactive performance management tool that displays on a single screen the most important information to achieve one or several

individual and/or organizational objectives, allowing the user to identify, explore, and communicate problem areas that need corrective action” (Yigitbasioglu & Velcu, 2012). Dashboards are a decision support system, intended to give management a quick view of organizational performance (DeBusk et al., (2003), by incorporating visual and functional features (Yigitbasioglu & Velcu, 2012). Thus, managers can analyse their strategy, implemented measures to achieve it, and the data they provide (Yigitbasioglu & Velcu-Laitinen, 2012).

A dashboard’s structure and design are paramount to its overall quality and adoptability, and they can vary, depending on their purpose (Yigitbasioglu & Velcu, 2012; Pauwels et al., 2009), as they can even be tailored to have a different appearance in response to different user requirements (Kruglov et al., 2021).

The goal of data visualisation, according to Jim Stikeleather (2013), is to represent information concisely and effectively, to communicate ideas that drive action, in an impactful and meaningful way. However, for this to happen, the data must be interpretable, relevant, and novel (Stikeleather, 2013).

However, there is still room to research and understand the best ways to establish, measure, visualise and interpret information, especially in the e-commerce sector, a key aspect of businesses today (Hasan & Tibbits, 2000). Moreover, machine learning is positioned to radically influence KPIs and data reporting to monitor & spur productivity and growth in unseen ways (Schrage & Kiron, 2018).

Companies and organizations in the book editing industry can place their focus on their data analysis and visualisation capabilities, to improve their performance measurement, thus becoming more productive and overtaking their competition. This is especially important, seeing as this fast-paced industry can be unpredictable and dynamic, which makes the access to quick, reliable, and enactable information highly valuable.

Understanding these key issues, the gaps in their study, and continuous potential for improvement, this project aims to study the current trends and state-of-the-art surrounding KPI selection, and Dashboards, as well as their overall design and implementation, to contribute with an innovative position regarding the best practices for managers and designers.

## **1.2 Problem description**

As the previous chapter explains, organizations today should try to improve their productivity to not only survive, but also overtake competitors, by understanding their strengths and weaknesses. PMSs set out to allow the analysis of data in a way that provides the key



information to make these improvements and aid decision making. However, it is difficult to know where to turn to, which data and KPIs to choose to analyse, and how to represent it. The goals of this dissertation are to provide analysts an overarching method that guides them to a KPI selection, and a dashboard design that maximizes their PMS and data analysis capabilities, grow, and improve. Moreover, with the application of it in a book editor, this dissertation aims to provide book editors with a valuable KPI selection and dashboard design to implement in their PMS, and also serve as a guiding light for other book industry organizations or segments to develop their own PMSs.

Knowing this, this dissertation's research questions are as follows:

1. How should the KPI selection process be conducted in a book editor?
2. How should the Dashboard design process be conducted to contain the selected KPIs?
3. Which KPIs should be selected and how should they be represented in a dashboard for a book editor?

### **1.3 Dissertation Structure**

To research the problems this dissertation sets out to solve, first a review of the current literature and state-of-the-art suggestions regarding Key Performance Indicators and their selection, dashboards and their design, and PMSs in general was conducted, followed by a characterization of the problem, and the specifics of the project undertaken to contribute to its resolve. Then, the logic and basis for the employed work methodology is explained, as are the main research tools that were applied. The application of the step-by-step methodology to design methods to answer the research questions follows. The developed methods are then conducted and applied as a project in a real company context. Finally, the conclusions of the dissertation are presented. In the end of the document, the appendixes that contain content developed and mentioned throughout the dissertation are available.

## **2 Literature Review**

To conduct the proposed work in this dissertation, that includes the development and implementation of KPI selection and dashboard design methods, a review of the state-of-the-art and the scientific literature on KPIs, their selection, application, use, and logically their visualization was conducted. This review extends to the studying of dashboards, their design, implementation, and employed data visualisation methods. First, focus is directed to KPIs and then to the dashboards where they are represented.

### **2.1 Key Performance Indicators**

The measures and indicators selected by an organization for periodic analysis is an extremely important factor for its success, which is why their Key Performance Indicators are the focus of frequent and thorough analysis. They are “the series of key indicators that are measurable and provide information on the extent to which strategic objectives are assigned to an organization in achieving success”, as they help define work targets of divisions or individuals, benchmark against peers, and give rewards and consequences to employees (Setiawan & Purba, 2020).

Maté et al., (2016) warn that KPIs must be differentiated from Key Result Indicators (KRI), that “are indicators which directly correlate with the satisfaction of a goal”, that have defined thresholds, values, and status, and that the organization cannot affect. The authors claim KPIs “measure the performance of key activities related to KRIs”, thus if KRIs change, so will KPIs.

#### **2.1.1 Challenges and opportunities**

When organizations’ decision making is not data driven, there is a disconnect between functional KPIs and strategic objectives, so if they have strong data capabilities, there will be more effective strategic alignment via KPIs (Schrage and Kiron, 2018). The authors also note rapid advances in machine learning have the potential to radically alter the use of KPIs (some managers even speculate that it may lead to individual customer KPIs) to be more predictive and prescriptive, and that the most data driven companies will enjoy competitive advantages in this matter.

In general, the selection of KPIs is a difficult aspect for all levels of organizations, in their capacity to improve performance, as selecting the wrong KPI is wasteful and provokes increasing inertia over time to change them (Maté et al., 2016).

According to Shrage and Kiron (2018), business leaders around the world are having trouble finding a “balance between tactical and strategic KPIs; operational and financial KPIs; and KPIs that effectively capture the moment while anticipating the future, (...) and adding more detailed KPIs or lasering in on a smaller, simplified set”. Moreover, Denning (2021) calls attention to the tendency of KPIs to be based on internal measures, which leads to “perverse incentives and unintended consequences as a result of employees working to the specific measurements at the expense of the actual quality or value of their work to the eventual customers”, which means that more work is being done, but it is unproductive, and at the same time just promotes a search for more KPIs, instead of the best ones. Thus, the author suggests KPIs to be external indicators, that deliver value to external customers, so the work done has a “clear line of sight” to them (Denning, 2021).

### **2.1.2 Advanced KPI use**

According to Shrage and Kiron (2018), advanced users of KPIs should develop a holistic and integrated view of the customer. They should place customers at the center of the organization, truly understand them, use them to manage and lead, and see them as data sets for machine learning to further focus on real-time analysis (Shrage & Kiron, 2018). Another key insight is to drill down into the KPIs components (as they often hide complexities whose analysis is critical for adequate and effective use), share trusted data to allow for collaboration and discussion, and aim for KPI parsimony (Shrage & Kiron, 2018) (which is why PricewaterhouseCoopers (PwC), (2007) suggests selecting 4 to 10 KPIs).

PwC calls attention to the fact that KPIs can gain or lose benefits depending on if they are segmented or grouped, and to the benefits on reliability of explaining the limitations and assumptions of the KPIs (PricewaterhouseCoopers, 2007).

The managers that successfully implement the aforementioned measures transform the organization (Shrage & Kiron, 2018), by paying attention not only to performance, but also the trends of the KPIs (PricewaterhouseCoopers, 2007) and using them in predictive ways, to look into the future, move in an agile way, and “to effectively align people and processes to serve the customer and the brand purpose” (Shrage & Kiron, 2018).

### **2.1.3 KPI selection**

Maté, et. al. (2016), claim that selection models must consider their indicators’ priorities, interrelationships, and influences, and must be aware that KPIs are entirely contextual, so even though organizations may share KPIs with peers in their industry sector, there will still

be significant differences between their selections. Kenny (2020) agrees with the aforementioned author that the KPIs' relationships must be reflected, especially since it is a two-way street in value creation. He goes on to add that the casualties between the KPIs must be considered and mapped, to understand how each measure "impacts others over time", hopefully positively as leading indicators (Kenny, 2020).

In the case of KPI contextualization, Grewal and Roggeveen (2020) claim that different customers will have different customer journeys, and consequently, different contexts. According to the authors, because different customers will have different pre-purchase, purchase, and post-purchase behaviors that are influenced by different situational (like social, cultural, political) and technological factors, they will need different KPIs. This is especially true, seeing as, according to the authors, technology advancements allow for improvement and adaptation of customer journeys, for example, with autonomous technology like personalized solutions and offerings, which has great potential for measurement (Grewal and Roggeveen, 2020).

The previously mentioned author, Kenny (2020) claims that the selection process should start with the identification of the key stakeholders, and the listing of measures that satisfy their expectations. To do so, inspiration can be taken from the Mendelow Power-Interest Matrix by identifying the stakeholders that have more power through their influence on the organization's strategy and resources, and interest in their success (Mendelow, 1981).

(Maté, et. al., 2016), suggests the following selection process. First, listing the top-level goals, and for each one assigning candidate KRIs or quantifying measures. Secondly, using this information, refine and simplify their goals, so the managers can start asking what is being done to achieve them, and if it is aligned with current goals (Maté, et. al., 2016). Finally, lower-level goals will be candidates to be monitored through KPIs, and any measure without an associated goal is included in the model without a relationship (Maté, et. al., 2016). To analyse this selection, the focus must be on cause-and-effect correlations between indicators, and on estimating the confidence and direction of the relationship (Maté, et. al., 2016). Simpler models may be needed if there is not enough confidence in the correlation, and after this process, measures can be defined (Maté, et. al., 2016).

CA Technologies (2012) suggests the choice of service delivery KPIs that follow the Information Technology Infrastructure Library's (ITIL) definition of "SMART", which is specific, measurable, attainable, relevant, and timely. The "SMART" concept was introduced first by George T. Doran (1981) to write effective goals, and since we have seen that KPIs originate from goals, it is logical that they also fulfill the definition.

CA Technologies (2012) also considers that consistency, communication, and how actionable KPIs are to be key considerations.

#### 2.1.4 Winning KPIs

Going over to the specific suggestions and expert opinions on the most successful KPIs for retail, in a survey done by Shruge and Kiron (2018), nearly 38% of respondents claimed that, excluding gross revenue, customer centric KPIs were in their top 3 KPIs (the second most common choice only had 9% of responses), while also claiming that they track customer segmentation, followed by customer lifetime value, brand equity, and churn, and indicate they will continue to prioritize them. Moreover, in that same article and survey (Schrugé & Kiron, 2018), measurement leaders appear to be more than twice as likely than the measurement challenged to already be investing in machine learning and automation, to monitor or have access to other C-suite or functional KPIs and appear to recognize how critical the ability to drill down on KPIs is.

Bressolles and Lang (2019) did a questionnaire to discover the most relevant KPIs of the e-fulfillment systems' performance for multi-channel retailers. The authors claim that "in multi-channel retailing, customers expect at least the same level of service, counsel and information with every channel", which is a challenging task. To succeed in doing so, the top 10 KPIs for the inquired companies in the questionnaire were, total investment of the warehouse, inventory cycle time, inventory carrying costs, safety stock volume, rate of obsolete inventory, order to delivery time, percentage of error in goods picking, revenue per order, pick rate per employee, and units shipped per employee (Bressolles and Lang, 2019).

More specifically, Muntean et. al. (2016) when evaluating what KPIs to choose for an e-commerce retailer to achieve increased sales, website traffic, and reducing calls to customer service, selected shopping cart dropout rate, average revenue per visitor, order conversion rate, average products in an order, and average value of an order.

Velimirović et. al. (2011), taking inspiration from a Toyota dealership, suggests for the sale department: the commonly used gross profit (and gross profit percentage), sales per person, stock turn, and for the business department: absorption, and return on sales.

With a focus on retailers, CA Technologies (2012) suggests, for service delivery tracking, metrics that meet the aforementioned SMART definition, like infrastructure capacity utilization, availability rates, service level agreement and target attainment, days of project backlog, percent of projects delivered on time, and onboarding, while for financial tracking, recurring and non-recurring revenue (and their ratio), revenue mix, cost of goods and services

sold, gross profit, average revenue per user, return on investment, EBITDA, and customer density, and finally for sales metrics, sales activity, customer retention, renewal ratios and satisfaction. PricewaterhouseCoopers (2007) suggests as important measures for retail: capital expenditure, store portfolio changes, expected return on new stores, customer satisfaction, same store/like-for-like sales, and sales per m2.

### **2.1.5 Other concepts to apply**

Kaganski, et al. (2017) suggest employing the Enterprise Analysis Model (EAM) tool to accurately “identify the weak spots of the company and provides the information regarding data, which should be collected for changing the situation in near future”. It includes a questionnaire that is linked to KPIs, that when answered helps understand the situation in the organization and identify bottlenecks (Kaganski et al. 2017). The authors’ EAM model as a part of the KPI selection model is divided into phases: data collection, data analysis, weight calculation based on the answers, ranking of answers, selection, implementation, and data collection. This process should be repeated to continuously improve performance, quality and value of the offering (Kaganski et al., 2017, to offset the current declining productivity levels, and act quickly to deal with the increasing pressure in the retail industry, according to Ellingrud (2022).

Cai et al. (2009) suggest an improvement to the Business Performance Management Cycle (BPM) to analyse the iterative KPI accomplishment, by inserting KPIs into the management cycle, building a quicker feedback mechanism, so thorough mathematical analysis of the relationships and feasibility of the KPIs is done between the goal setting and model building processes.

### **2.1.6 Post-selection work**

After selection and measurement, companies must be prepared to morph their PMSs, as KPI analysis should be a case of “set and reset, not set and forget” (Kenny, 2020), and the chosen KPIs must be reported, so PricewaterhouseCoopers (2007) developed a guideline for effective communication. This report asserts that KPIs must have a link to the strategy behind them, and a clear definition, purpose, and explanation of calculations, sources, assumptions, and limitations. Moreover, future targets, overtime changes, trend data, and benchmarking must be laid out. (PricewaterhouseCoopers, 2007).

The final step of the post KPI selection work is to advance to their implementation in a dashboard.

## **2.2 Dashboards**

To interact with KPIs, dashboards are commonly employed. Dashboards are visual displays “of the most information needed to achieve one or more objectives which fits entirely on a single computer screen so it can be monitored at a glance” (Few, 2006). Their purpose can range from consistency, to monitoring, planning, and communication (Pauwels et al., 2009) Their design is paramount for its quality, but it is also very particular (Eckerson et al. 2005). Eckerson et al. (2005) suggests that the tactical drivers for dashboards are resonating with users, providing rich data, empowering workers, aligning the business, and improving communication, visibility, and compliance.

Dashboards’ features must be balanced and in line with its purpose, but it may be hard to reach an adequate fit as the actual goals of a dashboard could be unknown due to fashion and fad motives, so it might be a good strategy to choose dashboard solutions that are more flexible and allow for easy upgrades (Yigitbasioglu & Velcu, 2012). In recent years, according to Unwin (2020), this has been the case especially with exploratory graphics, that fit with dashboards’ purpose, as they are designed for individuals that wish to explore and find new relevant information. Thus, their designer must have great interpretative skills (Unwin, 2020).

### **2.2.1 Visualisation**

Janes et al. (2013) remind us that in a dashboard’s design, the “right” selection of data must be combined with the “right” visualisation techniques. They also distinguish how a dashboard’s visualisation process can be set up, depending on the users’ requirements, as “pull” or “push” usage scenarios. The authors further explain that in a pull scenario, “the user wants to get a specific piece of information and uses the dashboard to obtain it”, while in a push scenario, “the dashboard must be designed so that important information is pushed to the user. Moreover, in a pull scenario the dashboard must contextualize itself and provide meaning to the data it presents, so it proves its usefulness and provides an exploratory interaction, while in a push scenario it must be effortless to see, interact with, and make it easy to understand the information that needs the user’s attention, in a visually pleasing manner (Janes et al. 2013).

According to Yigitbasioglu and Velcu (2012), “The process of visualisation involves two distinct phases: encoding and decoding”, and the evaluation of dashboards can be done by assessing how well they facilitate those 2 phases. The authors claim that if the decoding is done correctly, visualisation will be valuable and effective, as the actual data is reflected on perceived data quantities and relationships. However, for this to happen the users’ personalities must be taken into account (Yigitbasioglu and Velcu, 2012).

Yigitbasioglu and Velcu’s (2012) affirmations are echoed by Unwin (2020) that continuously calls attention to how the interpretation of graphics will define if their potential is met, while Stikeleather (2013), claims that the visualisations’ value is dependent on the data’s quality, on the accurate contextualization of the data, and on removing biases from the system.

Finally, Yigitbasioglu and Velcu (2012) claim that for visualisation to be efficient, the most data must be perceived in the least time possible.

### **2.2.2 Dashboard suggestions and design guidelines**

Tokola et. al. (2016) conducted a survey to gather insights on designing manufacturing dashboards for KPI display, whose results showed that a day was the most desired time period, tablets were the most popular way to use dashboards, and workers from different positions in the manufacturing process wanted to see some of the same KPIs.

For managers to be able to leverage performance reports and analytics, Ying et al. (2009) advise that the dashboard should contain (1) real-time notifications and alerts, (2) drill-down capability, so managers when receiving alerts can find the root cause of the issue and analyse it, (3) scenario generation, to simulate and calculate return on hypothetical action plans, and (4) allow external benchmarking comparison against industry trends, to then conduct gap analysis and determine opportunities for internal growth.

Veleu-Laitinen and Yigitbasioglu (2012) call attention to the importance of flexibility of the (5) presentation format, like graphs or tables, and to the fact that accurate data (6) “is correct, unambiguous, and objective but also meaningful and believable”, while data completeness depends on user demands. The authors conducted an explorative study that confirmed that these features “improved performance monitoring, decision rationalization, communication, and problem solving can enhance and speed up the decision-making process, leading to more informed decisions that are less likely to be resisted by others”. Moreover, Veleu-Laitinen and Yigitbasioglu (2012) discovered that there are synergies between feature (2), (3) and productivity, while (5) did not, just being seen as something that is “nice to have”, and finally in (6) quality was not a concern, but completeness was. Yigitbasioglu and Velcu (2012) also



called attention to the fact that “zooming out” of the dashboard to get a view of the users’ relations and contributions.

### **2.2.3 Dashboard tailoring**

Regarding the possibility of tailoring dashboards to different users, according to Vázquez-Ingelmo (2019) since they have different profiles and requirements, the suitability of a general dashboard solution is difficult, so domain-specific solutions and even user specific solutions are common suggestions. However, according to the same author, tailored dashboards require significant time and resources, and are difficult to adapt and reuse in other contexts, but user-friendly tools like Tableau or Grafana exist to create and customize dashboards without the need for programming skills.

Kintz et al. (2017) developed a KPI model, which extends as a separated role modelling and configuration method for dashboards containing role-specific intricacies, which allows for different users of the dashboard, with different roles, to see differing information and elements relevant to them, while also providing technical and setup guidance, seeing as the configuration of roles to users is done by the management.

### **2.2.4 Data presentation methods**

The way data is presented can make or break a dashboard, depending on its format, chosen method of analysis, and information to emphasize, as if it is inappropriately presented it will “fail to clearly convey information to readers and viewers”, not sustain their interest (In & Lee, 2017), and be poorly interpreted (Unwin, 2020). The authors believe the planning of how the data is presented is key, through weighing the advantages and disadvantages of each method of presentation: text, tabular, or graphical form.

A summary of the evaluation by In & Lee (2020) and the definitions Mahajan & Gokhale (2020) give each method of presentation follows:

Table 1 - Pros and cons of different data presentation methods

	Pros	Cons
Text	Contextualize, emphasize, and explain concepts;	Long texts with a lot of data take longer to understand;
	Useful for small amount of information as it takes up less space;	
Tables	Easily understand all the information presented, even in cases where it cannot be presented in a graph;	Longer data interpretation than in graphs;
	Appropriate for qualitative, and quantitative data, even if the latter have different variables;	Not appropriate for studying data trends;
	-	Difficult to identify and select the required information (Heat Maps are a variation that through colored backgrounds of cells improves ease of visualisation);
Graphs	Simplify complex information by using images and emphasizing data patterns or trends;	Some information can't be represented in a graph;
	Effective at understanding large sets of data, and representing smaller sets of data, or exploring quantitative data;	-
	“Reveal data features that statistics and models may miss (...) and raise questions that stimulate research and ideas” (Unwin, 2020);	-

The following types of graphs (that will be employed in this dissertation’s project) have their own benefits and issues, so selecting an adequate type will enhance the information, while a wrong one may ruin the understanding of the information:

- Scatter plot: investigate an object that is an association between two variables through points in an X-Y axis graph.
- Bar graphs: display comparisons among individual items. Its values are part of distinct categories through the height of bars in an X-Y graph, to understand gradual differences between them.
- Pie chart: shows the size of items in one data series, proportional to their sum, thus visually representing a distribution of data belonging to a few categories.
- Line graphs: variables that are observed and that change over time, especially the ones that identify data trends in equal intervals, large changes, or turning points.

Unwin (2020) calls attention to the synergy that combining text and graphs may provide, as the former provides context and improves the interpretation of the latter. However, the author warns that even though graphics have great potential, they must be researched more, as it is still difficult to study and identify the best ways to select and combine graphics, improve interactive and exploratory data displays, and educate the public on these aspects.

With the required tools to tackle the problem at hand, its characterization can be presented.

### 3 Problem Characterization

#### 3.1 Company Characterisation and Contextualisation

Grupo Almedina was founded in 1955 with the opening of a small bookstore in Coimbra, and today encompasses four imprints with different themes and purposes – Edições Almedina (Law books), Edições 70 (Human and Social sciences), Actual Editora (Economy and Management), and Minotauro (contemporary literature) – and a chain of 10 physical bookstores, one online bookstore and a Brazilian subsidiary – Almedina Brazil. Thus, they are present in different areas of retail, with varying levels of processes and logistics alignment, but as time goes on, they are investing in developing more omnichannel solutions, which happens when the companies' channels are fully aligned and coordinated, so a conscious effort is being put into aligning their physical (store-based) and virtual (online and mobile) channels through the coordination of order management, fulfillment, and logistics processes (Bressolles & Lang, 2019).

Since the Group's activities are mostly in Portugal, and this project was conducted in Portugal, for the Portuguese market, we must look at their competition in this specific market. Grupo Almedina's greatest competitors in the Portuguese market are Bertrand, which is also a book editor and retailer, with online and physical stores, Wook, a strictly online retailer owned by the Porto Editora book editor and publisher, Fnac, a retail chain that sells cultural products, including books, and electronics, and, finally, the international e-commerce retail marketplaces like Amazon. Individual and independent retailers should not be ignored either, as being more likely to connect with their customers and build a sense of community is a great perk to have and to increase loyalty (Raffaelli, 2020).

Taking this into account, and the fact that Grupo Almedina is not an independent bookstore, thus benefiting from a larger scale, but still facing the competition of larger companies that can beat them in price and inventory, they are in an interesting middle-ground, where they can take advantage of strategies employed by smaller competitors like independent bookstores, and larger or even different channel competitors, like Amazon or Wook, respectively.

The development of this dissertation was done in collaboration with the company, and specifically its editorial team. The company places a great focus on continuous improvement of its processes, including data analysis, to keep up with industry and technology advancements. More specifically, they wish to improve the access, consistency, and reliability of important information for their management and employees. Moreover, there are goals to analyse data not only for the past, but also in real-time, and assess the status of their performance, in comparison to their target and past performances, without wasting time

searching for and working on the data needed. To do so, defined step-by-step methods were designed, that can hopefully be applied to other organizations.

To specifically tackle Grupo Almedina's desire for improved decision making, data analysis, and PMSs in general, the selection of KPIs and the development of a dashboard were conducted for the editorial team, thus the results of the method's application will be adapted to this case. The presence in the team's operations and the access to constant communication with all levels of their organization was key to assure that the quality and reliability of information is high.

The dashboard contains a selection of KPIs adapted to the organization's mission, values, and strategy, and its users' needs, to improve the quality and efficiency of decision-making and overall productivity. Grupo Almedina's mission is "to build a strong publishing group, based on... [their] values promoting knowledge and culture", and its vision is "to be a source of knowledge and culture, reference and specialized, in the Lusophone world." Grupo Almedina places a great focus on quality and on the sharing of their expertise, as their group message is "From Experts, for Experts" (Grupo Almedina, n.d.).

To conduct the application of the developed methods with Grupo Almedina and its editorial team, the industry they participate in should be analysed thoroughly.

### **3.2 Industry Analysis**

The following analysis is shaped by the PESTEL analysis (Johnson et al., 2013) and the Porter's 5 forces analysis (Porter, 1979; Hitt, M. A. et al., 2016). These analyses were not conducted fully from top-to-bottom, but they guided the general industry analysis, with a focus on the aspects of these tools that are relevant to this specific case. Finally, the analysis encompasses the overall book industry and not one specific aspect.

The centuries old book industry has changed a lot in recent years. According to a report by Grand View Research (*Global Books Market Size & Industry Trends Report, 2022 - 2030*, 2022), the industry's market size value is 142.33 billion USD with an expected Compound Annual Growth Rate (CAGR) of 1.9% from 2022 to 2030, while a report by ReportLinker (*Global Book Publishing Industry*, 2023) presents more conservative values, of 99.9 billion USD and 1.1%, respectively. Specifically, the book publishing market is estimated to top at 96.1 billion USD in 2023 with a CAGR of 3.9% from 2023 to 2033, according to Future Market Insights (*Book Publishers Market*, 2023).

In Portugal, the economic crisis was a setback and a challenge for the industry in the upcoming years, due to reduced business volume, as customers were less willing to spend money on non-

essential items like books. However, contrary to what happened after the 2008 crisis, Portugal has shown great recovery since 2020 (Neves et al., 2014), when it was struck by covid-19's effects. Showing consistent growth in both volume of sales and number of edited books (APEL - Associação Portuguesa de Editores e Livreiros, 2023b), "the revenue of retail sale of books in specialised stores in Portugal will amount to approximately 195.34 million U.S. Dollars by 2025", after continuous growth (Statista, 2021).

The European and International Booksellers Federation (2022b) (EIBF) claims that the Portuguese market had a 17% growth in 2021, and in 2022 there was a 16.2% growth in market value (APEL - Associação Portuguesa de Editores e Livreiros, 2023b). These are signs of improvement and recovery, that are an opportunity that the book industry must take advantage of.

This result is supported by the EIBF's (2022a) claim that there is an increased interest in bookstores after the covid-19 pandemic, as Raffaelli (2020) further suggests that a reshaping of the bookselling industry has occurred, "with many booksellers undergoing a complete reinvention of their business models, often having to incorporate practices not associated with their traditional core business".

In regards, to the digitalization of print, Watson (2022) claims that "the presence, growth, and popularity of e-books and audiobooks will not necessarily herald the imminent death of print, but on the contrary, will allow publishers more options in terms of what and how they market their offerings to the public", as many consumers will transition to digital media "or combine it with print".

### **3.2.1 Competition and Pricing**

APEL (the Portuguese Association of Editors and Booksellers) conducted a study of the Portuguese book sector that advocates that there is intense competition, especially when it comes to promotional tactics, like discount cards, or reduced prices, which are already common practice (Neves et al., 2014). This is even more serious for smaller competitors without the scale to engage in these tactics, and that sell to customers that are already used to discounts. However, Portugal's law of fixed price attempts to combat this. It is a law, also employed in countries like France, Germany, Spain, and the Netherlands, "where the pricing of a book is fixed by law, meaning that all retailers must offer the same titles at the identical pre-set price, with the law foreseeing for a maximum discount rate, varying according to the country", according to the Decree-Law No. 176/96, of September 21st, amended by Decree-Law No. 216/2000, of September 2nd, No. 196/2015, of September 16th, and No. 94/2021, of November

9th). Specifically in Portugal, the editor and/or importer of the book sets its price that must be followed at 90 or 100% (and in some rare and specific situations 80%) by retailers and sellers for 24 months, in line with the same decree-law, with its price bound to its ISBN, a unique identification number given to monographs by the Portuguese Agency of the ISBN (APEL - Associação Portuguesa de Editores e Livreiros (2023a)). In other countries the price can be fixed by a trade agreement, still allowing discounts according to national regulations, with the goal of promoting value addition through the service or specialization offered (European and International Booksellers Federation (2022c)), and in others, books are priced freely according to their market value, with the goal of enhancing competition and resiliency in the sector (European and International Booksellers Federation, 2022c). These foreign pricing practices do not affect the Portuguese market, but they could in the future if legislations change.

With the appearance of e-commerce titans like Amazon, there was a decline in independent bookstores, making them face single-digit margins due to these new offerings of “virtually unlimited inventory at far lower prices than brick-and-mortar bookstores” (Raffaelli, 2020), but also due to the convenience of not only selling books, and leveraging their scale to offer extra benefits to customers. This, in turn, increases the barriers to entry as high investments are required to reach the scale, network, and reputation required to compete with their competitors. However, established e-commerce marketplaces with fewer barriers to entry can still expand horizontally and enter the market, which increases the threat of new entrants.

### **3.2.2 Costs**

The Bookseller’s Association of UK and Ireland’s President, Hazel Broadfoot in their annual conference highlighted “overheads - including staffing, rent and rates and especially utilities” as the main cost for book retailers, and notes that they are increasing (European and International Booksellers Federation, 2022d). Raffaelli (2020) expands on this notion by asserting that providing living wages for employees, overcoming rising rent costs, and razor-thin margins are their greatest challenges, as even though keeping up with rising labor costs is expensive, sustaining living wages attracts high quality employees. Moreover, the author asserts that bookstores can educate and convince landlords and government officials of the community value they provide, so rents can be negotiated. Ultimately, depending on books as the “vast majority” of goods they sell, makes gross margins highly influential on the businesses’ sustainability, which is a problem when we come to the realization that “profit margins on books are in the low single digits” (Raffaelli, 2020). However, the author still believes that portfolio

diversification, cutting on non-labor costs, and establishing partnerships that allow for higher-margin sales can respond to this challenge.

In these changing circumstances, the EIBF calls attention to acknowledging the importance of customer interaction in bookshops (European International Booksellers Federation, 2022b).

### **3.2.3 Bargaining Power of Suppliers and Buyers**

The suppliers in the book industry are book editors for retailers and for the editors themselves the printing houses, and authors. The book editors may have high or low bargaining power depending on the number of other avenues for a certain offering each retailer has. The authors' bargaining power is medium, as there are many of them, and they need an editor to publish and publicize their books, making them available in retailers that increase the public's interest in the book, but on the other hand, without authors the retailers and editors do not have a business. Their specific power will vary depending on their fame and public interest in their books. The printing and distribution partners' power is low, as there are many options, especially through coedition in low wage countries, and the job may even be horizontally integrated into the company.

The B2C buyers have high bargaining power, as razor thin margins and fixed prices reduce possibilities of value proposition, which allows for buyers to purchase from many different bookstores, while being medium for B2B, as book editors can work to provide a unique offering, making their product more valuable in buyer's eyes, even though many books are edited by more than one editor.

### **3.2.4 Government Practices**

The European Commission publishes reports to steer Member State's collective strategy "to support the needs and priorities of the cultural and creative sectors". The report on the Work Plan for Culture 2019-22 was designed with a "focus on exploring digital transformation and the relationship between culture and sustainability", and on COVID-19 recovery (European and International Booksellers Federation, 2022a). This report sees "booksellers and bookshops (...) as valuable resources to stimulate and promote reading", which can only be achieved by engaging readers to leverage the increased interest in reading after the lockdowns, and the Work Plan for 2023-2026 is already being designed with this focus.

Finally, even though there are many public measures for culture (both in Portugal and in the EU), many book retailers see them as ineffective or even nonexistent (Neves et al., 2014). As an example, APEL commented that the fixed priced law's duration increase to 24 months from



an 18-month period in 2022, would not bring major troubles to the market, but no noticeable benefits would be seen either (Queirós, 2022). On the other hand, Raffaelli (2020) claims the American Booksellers Association has been successful in establishing a top-down association, “a common collective and professional identity among independent booksellers”.

The main implications for the remaining work taken are that there is Intense competition in the book industry, specifically in promotional tactics and pricing, which is even worse for smaller competitors without the scale to compete. The law of fixed price in Portugal attempts to combat this competition by setting a pre-set price and possible discount rate for books, ensuring all retailers offer the same titles at identical prices, in order to promote fair competition. So, the quality and value of editions can be an important distinguishing factor.

An editor’s power depends on the availability of alternative avenues for retailers (their clients), the power and demand that the authors they work with possess, and the printing and distribution conditions they have.

Government policies aim to support the cultural and creative sectors, including booksellers, but they may be ineffective.

Even though these are the key conclusions for the work developed in Grupo Almedina’s editorial team, the overall industry analysis can be a useful tool for other types of organizations throughout the book industry.

With the problem that this dissertation is facing characterized, and its context clarified, the work methodology is developed.

## **4 Methodology**

### **4.1 Development**

The original aim of this research is to conduct a KPI selection and dashboard design for a book editor in a way that reaches optimal results, so a method was developed. This method is intended to be a valuable and relevant contribution to the current state-of-the-art and to be possible to reapply for other organizations with different goals, activities, and needs. Its application generated an industry-specific dashboard with an adapted selection of KPIs, but it also had the aim of accurately assessing the method's benefits, and correcting its issues, so it could be a contribution of the intended quality.

To do so, a work methodology had to be developed to follow from start to finish. The methodology chosen was not a concrete scientific one. However, to build it from the ground up, inspiration was taken from Design Science Research (DSR), due to its focus on the design and evaluation of an artifact in context, to solve organizational problems (Hevner et al., 2004; Peffers et al., 2007). In this case, the artifact is the KPI selection and dashboard design methods, as a method is an artifact (March and Smith 1995; Hevner et al. 2004).

The DSR has guidelines, summarized by Peffner et al. (2007) as identifying the problem and the work motivation, followed by defining the objectives for a solution. Then the design and development of the intended artifact can begin, afterward the demonstration of its use and its evaluation ensue. Finally, "the problem and its importance, the artifact, its utility and novelty, the rigor of its design, and its effectiveness" (Peffner et al., 2007) is communicated. As previously mentioned, the following methodology guidelines were undoubtedly influenced by the DSR ones.

Table 2 - Work methodology

Methodology steps	Description	Tools used
1. Company characterization	Characterize the company, its subsidiaries, its mission and values, its specific competition, and its PMS context.	-
2. Industry Analysis	Conduct a logical analysis of the industry, to understand the its competitive environment and the company's external environment.	Porter's 5 Forces Model, (Porter, 1979; Hitt, M. A. et al., 2016), which is still aplicable today (Dälken, 2014) and the PESTEL analysis (Johnson et al., 2013).
3. Company Segment Identification and Characterization	Identify the segment of the company with the lowest PMS satisfaction and quality to dedicate the KPI selection and dashboard design to.	Quantitative and qualitative research (Marshall, 1996; Creswell, 2013; Baxter and Jack, 2015) and requirement elicitation techniques (Nuseibeh and Easterbrook, 2000).
5. Key Performance Indicator selection	Design and implement the method for the selection of KPIs for the selected segment, taking into account the current literature's and experts' suggestions.	Multiple state-of-the-art KPI selection suggestions, requirement elicitation techniques ((Nuseibeh and Easterbrook, 2000), and quantitative and qualitative research (Marshall, 1996; Creswell, 2013; Baxter and Jack, 2015) for iterative corrections.
6. Dashboard Design Process	Design and implement the method for the visual representation of the selected KPIs, taking into account the current literature's and experts' suggestions.	Multiple state-of-the-art dashboard design suggestions, requirement elicitation techniques ((Nuseibeh and Easterbrook, 2000), and quantitative and qualitative research (Marshall, 1996; Creswell, 2013; Baxter and Jack, 2015) for iterative corrections.

The first 2 steps of the methodology have been conducted in the Problem Characterization chapter. They have the goal and focus of researching and finding the most trustworthy information regarding the company, its competitive environment, and its industry, in a country-specific and worldwide basis.

The following steps were conducted with the tools described in Table 1, but they require further exposition.

#### 4.2 Research tools employed

In this field of study, and specifically in this project's requirements and feedback gathering phases, quantitative and qualitative research were employed. Creswell (2013) defines quantitative research as "a means for testing objective theories by examining the relationship among variables", that can be measured and analysed using statistical procedures, while defining qualitative research as "a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem", employing emerging questions and procedures, accompanied by inductive and interpretive data analysis, typically gathered in the participants' setting.

In both quantitative and qualitative research, the study sample's aim, according to Marshall (1996) "is to draw a representative sample from the population, so that the results of studying

the sample can then be generalized back to the population”. To find this subject, both types of research were conducted through questionnaires containing open questions, and numeric rating questions, so that the team or segment that was lacking in the matter that this study aims to answer, could be distinguished and studied, as it likely presented the most potential for improvement. This sample is classified as a judgment sample by the author, as it is selected due to it being the most productive sample to answer the research questions (Marshall, 1996).

Despite all this, in this case, the research was mostly qualitative, due to its ability to provide, as explained by Baxter & Jack (2015), “tools for researchers to study complex phenomena within their contexts”, through a variety of lenses. Moreover, the same authors call attention to the benefits of studying and revealing multiple facets of the phenomenon in question. Finally, as it was previously mentioned, in the requirements gathering phases conducted to achieve a satisfactory development of the project at hand, the methodology was based on requirement engineering practices. According to Nuseibeh and Easterbrook (2000), there are 5 requirement elicitation techniques, some of which will be employed in this project. Traditional techniques like questionnaires and interviews, later being combined with prototyping due to their potential to “provoke discussion”, and usefulness in environments where there is “a great deal of uncertainty about the requirements”, which is the case of the KPI selection process for a segment of the company.

### **4.3 Research tools application in practice**

Interviews were employed to elicit the requirements of not only the Editorial team, but also the Commercial team, since they work closely, need to often look at the same indicators, and face many of the same issues with the company’s current PMS, while also providing an extra viewpoint.

Further goals of the interviews were to understand the interviewed team leaders’ roles and responsibilities, team composition and layout, management practices, and priorities.

Moreover, attempts at understanding the team’s overall data analysis practices and pain points, their approach towards customers, and how the company views them were made.

Finally, questions about specificities on the teams’ KPIs and dashboards were asked to gather requirements for the project at hand, to further understand their performance measurement capabilities, and where they could implement improvements.

The interviews were recorded with the participants' authorisation, and then transcribed for analysis. The conclusions taken from them were employed towards the application of the KPI selection and dashboard design methods that will be represented shortly.

The first interview was conducted with the Editorial team's leader, who would be the main user of the performance dashboard as he does daily data analysis to steer and guide his team's operations. The second interview was conducted with the commercial team's leader who also deals with the company's PMS on a daily basis, thus being able to provide valuable insights on the requirements gathering stage. The third interview was conducted with the company's Business Partner, who works towards continuous improvement for all teams and aspects of the company, at every level, to further understand the company's processes, and relationships with customers. A fourth interview was intended with the CEO, to have a better understanding of the company's top-level management procedures and identify their strategic goals as a whole and for the Editorial team, so it is possible to connect them to the derived KPIs. However, since both the editorial and commercial team leaders are present and highly influential in the analysis and definition of Grupo Almedina's yearly strategy and in the weekly coordination meetings attended by the management, the editorial, sales, and financial teams, they considered that all the needed strategic information was available through them.

#### **4.4 Company Segment Identification and Characterization**

##### **4.4.1 Selection process**

The selection of the segment of the company to work with and its boundaries was tackled by thoroughly understanding their goals, needs, capabilities, and flaws, so we can more effectively select the KPIs that should be analysed, and design a dashboard that fits them. With the help of a questionnaire that was distributed to the leaders of each team, their satisfaction with the performance indicators and dashboards at their disposal, and the need for improvements or changes in those aspects were assessed. The questionnaire placed the largest emphasis on KPI analysis importance, frequency, and quality factors, on the KPI's sourcing, selection process, and typology, also on the dashboards' efficiency and quality of information. The 3 departments that saw and/or employed KPI analysis as a key activity but were dissatisfied with the quality or the presentation of the information available were identified and taken into consideration. Then, through an internal analysis in the company, the target of the project was identified: the Editorial team.

#### **4.4.2 Chosen segment contextualization**

The Editorial team is a great match for this project, because they have the need for a more informed KPI selection process, in order to find more adequate KPIs that lead to increased efficiency, and quick and accurate decision making, They also have a close relationship with the Commercial team, that is an internal client for them, which provides this study with increased richness and complexity, since the selection and its process must be more intricate and worked upon to reach a desirable result for all interested parties. Finally, at the time of this project, a system was finishing development to insert the entire editorial processes in the companies' ERP, to be able to access and tackle data from the beginning to the end of a book's life cycle and link more information for each book and task the team had to do, thus resulting in more centralized information and higher quality decision making.

The editorial team's role is key for the company, since, as previously mentioned, Grupo Almedina has various book editors, each with different customer segments and value propositions. The editorial team develops the products the company sells to supply retailers with, including their own, Joaquim Machado SA. Thus, the team's work defines the company's success in delivering all their value propositions, as the quality of their editions affects the final customers' satisfaction, which is the focus of the company's B2B clients, and their own retailers. Moreover, some of their editors are key participants in their field, like Edições Almedina, which increases the importance this segment has for the entire company's performance.

The editorial team is formed by the team's leader, whose role is to manage the team and connect it to the commercial team with proper alignment of information and goals. The Editor is made up of 20 to 30 employees that work on the company's editorial plan and catalogue, while 5 manage each editorial label contained in Grupo Almedina, and assure that books reach production with the publishers (printing houses).

##### **4.4.2.1 Book editing process**

Understanding the general book editing process the editorial team follows is key to truly have the context to develop the project at hand:

First, the original proposal, whether provided by a foreign author/publisher or sought out by the team, is analysed. Subsequently, a print run proposal is formulated, accompanied by an analysis of the business figures and a feasibility analysis. The book is then presented during the editorial decision meeting, which takes place throughout the month. Once the book is approved, a contract is signed with the author, and the production planning phase begins. At

this stage, the book undergoes translation, revision, and typesetting. Meanwhile, the production team requests an ISBN from APEL. The cover design is requested when the book is in the typesetting phase. Once the book's content (text) is finalized, the cover can be finalized, as the book's spine size is known. Finally, the final print run is determined, and the book proceeds to the printing press.

#### **4.4.2.2 Book editing costs**

The publication process of books, whether they originate from foreign or domestic sources, involves several essential steps. For both foreign and domestic books, the main costs undertaken are translation, revision, typesetting, cover design, image acquisition (for the cover and/or for the book's content), printing, and copyright compliance.

#### **4.4.3 Conclusions to take**

After considering the intricacies of such a complex and unexpectedly costly process as book editing, we can understand why having a reliable, effective, and timely PMS is so important and why it requires detailed and thorough exploration. The editing process is long, with many stages of varying complexity, where lots of things could go wrong, resulting in losses and inefficiencies, which must be identified and avoided at all costs. There are also different types of costs that must be controlled, and that can be worked upon to improve margins. Moreover, monitoring costs can also help identify issues with the process.

### **4.5 Key Performance Indicator Selection**

After a thorough review of the current literature and suggestions by the scientific community, a selection process for KPIs was designed with the authors' recommendations and the experience of the company in mind, so if this process is employed for another organization it may need to be adapted to their needs.

The EAM application suggestion by Kaganski et al. (2017) contained a more extensive data collection and analysis, and a selection based on the answers and requirements gathered. The following selection process takes inspiration from the authors' focus on user requirements, but since in this specific case there is not an extensive list of users, the selection process will have less of a focus on the data collected from them. The step-by-step process is as follows:

Step 1 - Identify the key and relevant stakeholders for the organization and specifically for the selected segment's work (Kenny, 2020).

Step 2 - Identify the external customers and their journeys, so they are at the center of the process' focus (Denning, 2021; Grewal and Roggeveen, 2020).

Step 3 - Identify the organization's top-level strategic goals as a whole and for the segment (Schrage and Kiron, 2018).

Step 4 - Identify the low-level segment's requirements and needs for their various periodic data and indicator analysis (Nuseibeh and Easterbrook, 2000).

Step 5 - Select the initial batch of KPIs taking the previous steps into account (do not enact parsimony yet).

Step 6 - Conduct a user feedback session, and check if they fulfill the ITIL's definition of "SMART", which is specific, measurable, attainable, relevant, and timely (Doran, 1981; CA Technologies, 2012). Cut the ones that do not and use the feedback to enact corrections and improvements to the selection.

Step 7 - Enact KPI parsimony, aiming for 4 to 10 indicators (PricewaterhouseCoopers, 2007), and good practices, by searching and prioritizing, from most to least important, the ones that are requirements, and that allow for real time and drill down, customer focus, target definition, benchmarking, predicting capabilities, and target definition (Ying et al., 2009; Yigitbasioglu and Velcu, 2012).

NOTE: In the later dashboard design process, some KPIs may be cut due to issues with their design, presentation, reporting, or they may even prove to not be relevant in practice.

Step 8 - Report the selection of KPIs, including their definition, purpose, relationships, links to the underlying strategy, sources, limitations, assumptions, and calculations (PricewaterhouseCoopers, 2007).

Step 9 - Communicate the importance of continuous setting and resetting of the indicators, considering the further and constant analysis of future targets, overtime changes, trend data, and benchmarking (Kenny, 2020).

#### **4.6 Dashboard Design Process**

The goal of this process is to design the dashboard through which its users will analyse their high quality and useful KPIs and other indicators to support decision making, in a way that effectively enhances the selected KPIs, and allow for quick visualisation, interpretation, action and thus, higher productivity and growth. The design of this screen will surely impact



if and how the user can achieve the aforementioned goals, so a well-thought-out design process is necessary. Considering the best practices suggestions of the current literature, the step-by-step process was as follows:

Step 1 – Elicit the dashboard users' requirements for it, taking into account their personality traits and what works (and has worked in the past) for them (Yigitbasioglu and Velcu, 2012).

Step 2 – Identify, study, and experiment with the organization's technological resources and their limitations and consider them when designing the dashboard.

Step 3 – If possible and valuable for the specific user, explore the option of “push” and “pull” scenarios (Janes et al. 2013), and of applying alerts and notifications, benchmarking, scenario generation, (Ying et al., 2009; Yigitbasioglu and Velcu, 2012), and dashboard tailoring (Kintz et al., 2017; Vázquez- Ingelmo, 2019).

Step 4 –Design a static or dynamic mockup of the dashboard (depending on available time and resources), with descriptions of its features, views, and indicators, their periodicity, and their relationships. Employ the suggestions of academic literature reviewed in this dissertation, that are adequate for the specific users.

Step 5 – Conduct usability testing and feedback sessions with a sample of the dashboard's users, implementing the corrections that may improve the dashboard (Bastien, 2008).

Bastien (2008) defines usability testing as a method in user centered design that users directly participate in, by engaging in specific tasks or in the free exploring of a system or product, while they are observed. The “time required to complete a task, task completion rates, and number and types of errors” is recorded, so flaws and potential improvements with it can be identified. The goal of this method is to evaluate the degree to which a system is effective, efficient, and “favors positive attitudes from the intended users” (Bastien, 2008). The author also notes that the location of the test is also a part of the preparation of it, but as the project at hand was remote, which yields comparable results to laboratory testing, that question is answered upfront. Anyway, the author still differentiates remote testing as synchronous, which was employed in this project, which is “where a facilitator and the evaluators collect the data and manage the evaluation session in real time with a participant who is remote usually through a video conference tool”, and asynchronous testing, where this does not happen, and is more directed at larger groups of participants.

The general steps of usability testing, as suggested by the author, adapted to this project are: Objective definition > Qualification and recruitment of participants > Task selection and scenario description > Measures and data collection method selection > Prepare the test (its

materials, environment, and protocol) > Select and conduct satisfaction and feedback assessment > Present and execute the knowledge gathered.

Step 6 – If the organization requires it, design the dashboard through their preferred tool.

## 5 Results

### 5.1 KPI Selection

The final selection of KPIs for the editorial team's dashboard is divided into 3 "cubes" of information, so the dashboard and its layout is logical regarding the types of data that are grouped and connected.

The cubes of information, the KPIs selected for each of them, and their available drill downs are:

Table 3 - KPI Selection and their Dashboard Layout

Information Cube	KPI	Periodicity	Drill Downs
Sales	Sales (in quantity and value (€))	Daily	*
	NPS for B2B	Monthly	Editorial Label
	Top 10 Books Sold	Monthly	Editorial Label & Editor
Operational	Production Costs	Daily	Editorial Label
	Stocks	Daily	Editorial Label
	Ratio of Obsolete Inventory	Weekly	Editorial Label
Performance	Edit Cost / Revenue Ratio	Monthly	Editorial Label & Editor
	Edit Time to Market	Monthly	Editorial Label & Editor
	Edit Cost Variance	Monthly	Editorial Label & Editor

\* The Sales cube and the Sales KPIs have the most drill downs available, so they require further exposition. The Sales themselves can be drilled down to show their % of Coeditions, Reeditions, and "Books under Budget". The user can drill down the entire cube for each editor, each editorial label, and each client (except for the NPS for B2B, which can only be drilled down for each editorial label), on top of the aforementioned Sales drill downs themselves, or for the general Sales values.

## 5.2 Application of the KPI Selection Process

In this chapter the chronological application of the KPI selection process is displayed in detail, step-by-step.

Step 1 – Grupo Almedina’s key stakeholders are their customers, due to their high power, as they and their choice are what dictates the company’s success, even though their interest in it is not very high. Another reason for this is that the company has to face fierce competition in both their B2C and B2B operations from other similar book retailers and editors like Bertrand, online focused book retailers like Wook or Amazon (that often offer a better price), editors like Porto Editora, and even independent bookstores. In this context, the company must offer their customers a distinguishable quality service to attract and keep them. As an example, even in situations where they are in a dominant position, like with their Edições Almedina’s success with Law universities, if they do not satisfy the students that require the codes, their professors, and the universities in general, they will just order from another editor.

Other highly important and relevant stakeholders for the company are the authors, since they create what the company edits and sells, and without them the company loses its business. They must attract and keep them, especially the ones that generate the most demand and provide the most sales in quantity and value. Workers are the driving force of the company, as their cohesion and performance are what makes it move as one. Both of these stakeholders have a mutually beneficial relationship with the company, so their interest and power is medium.

Finally, attention must be given to the management, since their duties, experiences and desires for the company are much different than the ones that workers on a lower level have, as their work guides the company and strongly influences its potential for success. Due to their high power and interest, they could be seen as the most important stakeholders, but due to the more modern suggestions of being more customer focused, we will just look at them as very important, and not key.

The company still has other stakeholders, but they are either not as important to satisfy and inform, or they are not as relevant, for example, suppliers.

Step 2 – The overwhelming majority of the editorial team’s transactions are B2B, which means that their external customers are businesses that are supplied by Grupo Almedina

editors, and that then sell to the final customer, as even Joaquim Machado SA, the internal company that handles the Almedina retail stores, is seen as a customer.

The main B2B retailers that the company sells to, classified as A clients, are Joaquim Machado, S.A., Fnac, Bertrand, Continente, and ÉL Corte Inglés, but the company also sells to B clients, the universities' bookstores, and, finally, to C clients, the small independent bookstores. These are all already different customers with different needs in the same class, but the differences are even greater for the ones in different classes. For the more important A and B classes, the commercial team ensures that there is constant communication to ensure their satisfaction, but also so the company's products are presented and marketed properly, while for the C class there is just an online portal to handle communication and enhance the post-purchase stage.

Keeping all this in mind, the final customer is the most important one to keep satisfied, as they are who ultimately purchases the books the company publishes and sells. It's important to note that the B2B buyers have a year to return the books they order, and many purchases are made through consignment, so if customers do not show enough demand, many books will be returned, and will not be paid for.

Having identified the company's key external customers, we must look at their journeys. Since their editorial business is focused on B2B, the situational aspect of their journey is not as influential as in their physical stores, but it is still relevant, as many interactions still occur between companies and their workforce on pre-purchase, purchase, and post-purchase stages, and a focus on improving on what they can control in that aspect is relevant.

The company's actual B2B customer has a somewhat cyclical pre-purchase, purchase, and post-purchase cycle. The editorial team works to provide their customers (retailers) with an attractive and dynamic offering of books to order. They value new releases, at an adequate margin that satisfies them, thus having a clear influence on the pre-purchase stage, and on the post-purchase stage by providing quality and attentive customer care, granting the possibility and ease of returns, and valuing continuous improvement of their offering by considering feedback and further demands.

When it comes to the final customer, the Editorial team can mostly influence them in the pre-purchase, purchase, and post-purchase stages through the quality of its products. This team is the one who decides what is edited and manages the editing process, so their job highly influences the quality of the company's output, which is what the customer purchases and hopefully enjoys. The Editorial team can only assess the final consumers' satisfaction through the retailer that delivers the products to them, as the aftersales care is in the hands of the retailer, but they can still have an idea of it due to the company's ownership of the Almedina

stores, and due to the retailer's satisfaction being connected to the final customer's satisfaction. If the Grupo Almedina books are top performers, the retailer will undoubtedly be satisfied, so this is a prospect that must be exploited in this selection.

As extra contextualisation, the other team's influence on the customer journey stages is available in the appendix D.

Step 3 - The company's strategy is set yearly, majorly through financial data and towards certain financial goals. It is divided between Financial, Client, Internal Process, and R&D focused strategies.

- The financial strategy is based on pleasing shareholders through the expansion of the company's growth opportunities. They hope to achieve this mainly by increasing turnover through expanding their editorial line and its lifecycle, and exploring multiformat and multiperspective content.
- The client strategy aims to surpass the clients' expectations and increase brand notoriety by improving their curatorship (specifically the books and authors selected to satisfy who consumes them), edit quality, and ease of access to their products (in sales points that include the almedina.net website), and ability to discover ideas and authors.
- The internal process strategy seeks to generally improve procurement, through better networking and connections, improve selection due to better market shifts knowledge and response time, normalise and agilize the end-to-end process, and intensify the communication of products to the final customer.
- Finally, to improve R&D they work towards the continuous improvement of their R&D processes, adopt marketing intelligence practices and agile methodologies, and form, develop, and retain quality talent.

The conclusions we can take from this strategy to apply in the selection of the KPIs are:

- selecting financial indicators that are affected by and that display shifts in the company's growth, caused by improvements in the mentioned aspects;
- selecting customer/client focus indicators that display improvements in the customers and clients' assessment of the brand's quality of products and services;
- selecting internal process indicators that reflect improvements in their efficiency and reliability;
- selecting R&D indicators that detect quality talent that employ efficient practices.

In summary, the strategy places great focus on improving the product/services' quality, and their processes' efficiency, which is reflected in numbers, justifying the type of KPIs selected.

Step 4 – The editorial team's low-level strategies are sourced directly from the company's yearly strategic quotas and guidelines, and from the team's information needs. This top-level strategy's influence in their PMS explains why their top KPIs are so quantitative. This is a clear requirement for the current selection of KPIs, as these indicators are key to keep the machine running, by assessing their periodic work capacity and efficiency, the path to fulfill their strategic quotas, and, hopefully, to drill-down and uncover the reasons for lagging issues.

Despite this, to achieve their quotas the team must follow a low-level strategy that is enacted and adapted weekly according to the seasonality of the industry, the different publishing activities of each editor, their client's needs, and any shifts in top-level strategy.

The editorial team's strategy has extra intricacies at hand since they work hand-in-hand with the production, as the catalogue and editorial plan the editorial team creates, and with the commercial team, as they handle the sales of the products, which is why there are weekly strategic meetings between the 3 teams.

At the moment, as it was mentioned in the previous step, chasing strategic numbers seems to be the focus of their PMSs. For example, sales are the team's number one goal, and thus indicator for performance measurement as a whole, but also on an individual level to assess the workers' productivity. However, as it was mentioned before, quoting Denning (2021), this can lead to a preference for more low-quality work and the chasing of numbers without substance. Moreover, the team's customer focused KPIs, like their surveys are not given enough importance and may prove to not be enough.

Knowing this, and looking at the fact that the team's leader, rated his satisfaction with current KPIs with a 2/5 rating, due to some of the information presented being outdated, or not in real time as it should, some being missing and incomplete, which in turn leads to a reduced periodicity of analysis, there is still room to work on the PMS at hand.

Finally, the editorial team's leader is striving to increase PMS and data analysis literacy in his team, to increase the quality, efficiency, and reliability of his team's decision making.

Step 5 – Towards the initial batch of KPIs we first look at the users' requirements, then practice the suggestions of the current literature. Thus, the first aims of this selection are to promote real time analysis, but with the ability to look at past comparable periods, and drill down to further indicators, thus allowing for more in depth looks to understand the cause for

certain occurrences, like inefficiencies. There are other requirements, like real-time benchmarking, that are not attainable or timely since the company does not have access to their competitor's numbers. However, benchmarking against the company's own past results is possible, and a key requirement. Moreover, there is an opportunity to achieve benchmarking of numbers like sales of past periods of time through consultancy services that provide the company with that information.

Fueled by the gathered requirements, different views were initially defined to drill down from the overall editorial team view: a view that shows the indicators per editorial label, type of author, and client, to get a better look at where the company is winning, losing, and not taking advantage of opportunities.

Proceeding on to the actual selection, the KPIs required by the user are selected: Sales, Stocks, and Production Costs.

Regarding financial indicators, we prioritize the ones that represent the results of changes to the editorial line and life cycle. Sales is the KPI that the team through their work experience has found to be more valuable, even though, they are a result of the team's activities, thus being a KRI. Making that distinction, it is still selected and represented due to how important it is to monitor for them. Since only looking at Sales numbers is misleading as different books have different margins, this indicator distinguishes the Sales in quantity and value (in euros). It provides an overall viewpoint on the status of the team's work towards their goal, with the opportunity to drill down and look further into the data to spot issues. From Sales, going over the rest of the selected financial indicators, the users can look at Concurrent vs Non-Concurrent Revenue. This indicator was selected due to its ability to identify products that had unusual revenue due to temporary internal or external influences on demand, that in the future could change drastically.

Shifting to operational indicators, Production Costs and Stocks are required for the reasons mentioned in Step 4, and due to providing a solid overview of their operations. However, with the aim of enforcing the previously mentioned "winning" KPI suggestions, the following Operational indicators are selected to look at more detailed data that can uncover issues:

Inventory Cycle Time, Rate of Obsolete Inventory, and Inventory Carrying Costs.

Worker's Performance KPIs are lacking in the team's PMS, so to analyse the editors' efficiency, quality of work output, and understand if work is being done to agilize processes and make them more reliable, we will select the following indicators that fit the current literature's suggestions with the company's specificities: N° of Days for 1st Edition Sale, % of Coeditions, Edit Cost / Revenue Ratio, Edit Cost Variance, Edit Time to Market, Edit Turnaround Time, and % of New Arrivals Sold.



Finally, towards the customer focused indicators, which were also lacking in the team's PMS, but with the added matter of its analysis being increasingly important for companies today, a Net Promoter Score to quantify the editors' performance according to both the B2B and B2C customer, which is accompanied by % of Deadlines Met, Error Rate, Complaints per Issued Invoice, and Order Fulfillment Rate to identify the talent that should be retained and rewarded through the assessment of not only their efficiency, but also their overall quality of work, and the customers' assessment of it.

Step 6 – To understand if the selected indicators were Measurable, Attainable, and Timely, a feedback session was conducted with the company's Chief Technology Officer, and to understand if they were Specific and Relevant and to select each indicator's periodicity a questionnaire was delivered to the editorial team leader. An interview was not conducted with the latter due to the interviewee's schedule constraints. The company's business partner was present in both sessions to help conduct them and provide her own feedback, which was highly beneficial.

The indicators that did not fulfill the "SMART" 5 principles, from left to right (so if they are not Specific the rest of the principles would not even be assessed) were cut. The suggestions and corrections given by them were considered and implemented as well. The table containing the indicators, drill-down views, "SMART" evaluation, and periodicity is available in the appendix E section.

It contains the correction of replacing the author type view with a view for each editor since the data for the first view would not be possible to measure and attain, while a view for each editor as an added performance measurement tool is more relevant and useful, due to the clear differences of each, that stem from their differing product themes.

The Recurrent vs Non-Recurrent Revenue, % of Coeditions, NPS for B2C, and individual expense Production Costs were cut due to not being attainable without specific work being done to label and gather the data for it. They were considered relevant KPIs, and potentially useful, as the first provides important predictions on shifts in demand, the second provides an outlook into what editors are being cost-efficient by guaranteeing coeditions (which are outsourced book edits for a lower price), while the third looks at the final customer's likelihood of promoting the company's books, which shows how much the company is satisfying the most important customer. This is reflected in the table with a \* sign.

Other KPIs that were cut due to not being relevant enough were Inventory Cycle Time, N° of Days for 1st Sale, Inventory Carrying Costs (even though it was not measurable, to begin with), Edit Turnaround Time, and Complaints per Invoice Rate. The first 2 were considered

irrelevant due to not being the most appropriate for the team's specific aspects and processes. The Inventory Carrying Costs are more relevant for the logistics and warehouse department, the Edit Turnaround Time was replaced previously by the more relevant and customer oriented Edit Time to Market, the Complaints per Invoice Rate were not considered relevant, and the Error Rate failed in every aspect of the evaluation.

After this analysis, 11 indicators are left: Sales (in quantity and value), Stocks, Production Costs, Ratio of Obsolete Inventory, % of New Arrivals Sold, Edit Cost / Revenue Ratio, Edit Time to Market, Edit Cost Variance, % of Deadlines Met, Order Fulfillment Rate, and NPS (for B2B clients).

Step 7 – To enact parsimony and reduce the indicators to the ones that are truly key, the aim was for the fewest possible between 4 and 10. However, the specificities and requirements of the users of our KPIs, and not only the literature, should be taken into account. In this project, the users prefer having access to more indicators, and value many of the KPI candidates highly, so there won't be excessive cutting of indicators to reach an optimal number.

The table in the appendix A contains the evaluation of the indicators' ability to allow, from most to least important, being mandatory through the requirements, real time, drill-down, customer focus, benchmarking, predicting capabilities, and target definition. The final selection of KPIs considers these capabilities to aid in decision making, and their calculations. As represented in the table, the Order Fulfillment Rate was cut, with the help of the evaluation factors, but also because it is more directed at logistics (even though the Editorial Team's output directly influences the inventory and what happens to it).

Since the factors have the most importance from left to right, theoretically, we should not have selected Edit Cost / Revenue Ratio, or the Edit Cost Variance, but the Order Fulfillment Rate. However, since the latter's customer focus is not direct nor major, the others were selected as they focus more on key factors like, cost efficiency for the Edit Cost / Revenue Ratio, and cost prediction and management for the Edit Cost Variance. Moreover, the % of Deadlines Met already focuses on the fulfillment of orders.

Step 8 – With the selection finished, the list of selected KPIs at this point of the selection method and their calculations are represented in the table in the annex A.

The KPIs definitions are:

1. **Sales (in quantity and value) (daily):** The total quantity and value of products sold in a specific day. An increase in sales in both quantity and value will undoubtedly be positive and may show the team is on the right track.
2. **% of New Arrivals Sold (weekly):** The percentage of weekly sales that are products classified as “New Arrivals”. This KPI aims to assess how well the “New Arrivals” are doing in terms of sales, which in turn allows for the evaluation of the editorial team in their goal of providing new, interesting, and valuable products to their clients.
3. **Stocks (daily):** The inventory of products and other incomplete goods being held by the company in a specific day. This KPI, by tracking inventory numbers, calls attention to areas where action must be taken to correct stock numbers that are under or over the desirable values.
3. **Production Costs (daily):** The expenses that stem from the production of products. This KPI aims to track and assess the production costs to improve their cost efficiency by cutting them where possible without reducing the quality of their output.
4. **Edit Time to Market (monthly):** The time required for a product to be developed, produced, and delivered to the clients, in this specific case, from the moment a book edition is accepted until it is made available for ordering. This indicator was converted from “Edit Turnaround Time”, due to the notion that it would represent the speed and efficiency of the Editorial team to deliver a new offering to the market and remain competitive better, from the beginning to the end of the product’s development lifecycle, while the original option would be more suited to assess the productivity of a general process.
5. **Edit Cost Variance (monthly):** The percentage from which the actual cost of an edit varies from its budgeted cost. This KPI aims to assess the financial efficiency and effectiveness of the Editorial Team, and how realistic and accurate their cost predictions are. It also enables them to identify areas where costs were excessive, and where they could save or optimize resources.
6. **Edit Cost / Revenue Ratio (monthly):** The ratio between the cost of the edits and the revenue they generate in a month. This KPI aims to understand where and what their winning

products and workers are, which are the ones that can generate the most revenue with the least costs.

**7. % of Deadlines Met (weekly):** The percentage of orders whose delivery meets its agreed deadline from the total number of orders in a week. This KPI aims to understand how the team is doing in terms of meeting deadlines, as unmet deadlines are highly unsatisfactory for their clients, and where they need to improve their processes to prevent this from happening.

**9. Ratio of Obsolete Inventory (weekly):** The percentage of inventory that is classified as obsolete, meaning that it will not be sold, and its cost is sunken. This KPI aims to identify products, product types, and editors, who face a worrying lack of demand for a part of their product offering, be it due to a lack of interest in the product that is offered, or due to an issue with the amount that is produced, stemming from an inflated prediction of demand.

**10. Net Promoter Score (NPS) for B2B (monthly):** A metric that measures how likely it is for a client to recommend the service and product to others. It can be tied to surveys to identify areas of improvement. The aim of this KPI is to provide a higher focus on the quality of their output in the eyes of the customer, which is not only, arguably the most important factor of a company's activities, but it was also neglected in the editorial team's PMS. By assessing how the clients' see the company, it is possible to not be overly focused on cutting costs and increasing output numbers, but to also satisfy the client and keep them loyal.

A table with the relationships between KPIs and their explanations is available in the appendix B and C, respectively.

The data sources of the KPIs are the company's ERP system and its database (Sage X3), which contains great amounts of data, from financial to operational, contributing to around 90% of their data. The rest of the data sources are databases that are created from the ground up by the IT team, to complement the data needs that cannot be supplied by the ERP system. For example, the NPS scores would come from a spreadsheet, or something similar to it, which would then be connected to a database to source the KPI.

The limitations that the construction of a dashboard with this specific selection of KPIs are the lack of access to some types of data, which is why a few indicators were cut in the selection process, and the great volume of information that the company processes and holds, specifically, an extremely long list of transactions and catalogues, that stem from the

company's lengthy history and the book industry's characteristics. Book editors and retailers need to have an extensive catalogue of existing products available, all while developing new products to meet the demand already mentioned demand for new arrivals to the market. The aforementioned volume leads to high processing times to access the required data and information, to difficulty in finding what is needed and accessing it in real time, which in turn makes it costly. This is why many data sources are a data warehouse, where the company makes copies from other databases with a structure that is more user-friendly, and to prevent cases where work is done on top of other information, whose changes will affect other people actively accessing it. This is achieved through a consolidation program (ETL).

Step 9 – The communication of the importance of continuous setting and resetting of the indicators, considering the further and constant analysis of future targets, overtime changes, trend data, and benchmarking was done in the usability testing and feedback session. Moreover, the KPIs that were relevant, but still got cut in the selection process were given as suggestions for future potential implementation, especially considering as KPIs in this selection can in practice, over time, not prove to be relevant or adequate. Thus, they could be replaced by one of the suggestions or by other KPIs that the continuous analysis and research help identify as a requirement. Specifically, there is work that can be done to allow for the analysis of the Recurrent vs Non-Recurrent Revenue, % of Coeditions, and NPS for B2C, as they are even more relevant than other selected KPIs, but either way, the selection must respect the requirements and limitations placed upon it by the users.

### **5.3 Application of the Dashboard Design Method**

In this chapter the chronological application of the dashboard design process is displayed in detail, step-by-step.

Step 1 - Through the interviews that were conducted with the team leaders and the business partner, the most common and important requirements are real time and drill down capabilities, a clean and consistent design, and a dashboard that allows and promotes flexible, continuous improvement of itself. Other important requirements are consistent and pleasing color-coding, drag and drop capabilities, different views with a filter to select the desired one, but with equal and consistent data, titles and descriptions, specified time periods, and overall clarity.

Finally, the main goal of this dashboard is for it to provide useful information that a manager can act upon quickly and efficiently, while alerting and sensitizing them regarding issues and inefficiencies, so the selected KPIs must truly be key for the editorial team, and concurrently allow for a deeper dive on the available data.

Step 2 - The company has an IT team that works continuously to improve these systems and provide the managers and workers with the tools to assess their performance and improve decision making with the most efficiency and accuracy.

Their ERP system is Sage X3, where their sales are integrated through 2 different auxiliary systems. They have an in-house developed CRM system, but the goal is to replace it with a higher quality official tool. Their data warehouse and PMS are fed through the Sage X3 system and other more specific databases.

Their current PMSs are Qlik Sense, an intuitive data modelling tool employed with the goal of analysing large data sets from different sources in a more detailed and dynamic way, and Grafana, a user-friendly and highly customizable data visualisation and monitoring tool. Grafana is more static and focuses on real time, quick analysis of operations and logistics, supporting multiple data sources, alerting, and a variety of visualisation options (Singh, 2023). Moreover, the company was developing a Management Program (MP) concurrently with this project, to insert the editorial process in their ERP system, so there is consolidation of their information systems and so information can be accessed regarding books throughout their entire life cycle, which in turn enhances the application of this dashboard as time goes on.

Taking this and the desired dashboard's intent in the first step into account, we could define Qlik Sense as the selected tool to design it and for its users to interact with it. Even though the literature suggests the application of real time and the simplification of the dashboard to turn it into a screen whose "at a glance" analysis would allow for quicker decision making, thus making Grafana the best choice, it could result in a lack of adoption of the dashboard, as the company and the editorial team's requirements showed that a more detailed, exploratory, filtered dashboard was preferred. Moreover, Qlik Sense allows for other previously mentioned capabilities that define quality dashboards: color-coding, drag and drop capabilities, different views and filters, fast loading times, personalization, and accurate and detailed data.

The mockup's design in Step 5 had the program's intricacies and features in mind, through the studying it with the help of the company's IT department and Qlik Sense's official guides, so that the idealized mockup would be possible to effectively create.

The suggestion of experimenting with the organization's technological resources was added at a later stage because before the design of the mockup, there were several sessions of experimenting on Qlik Sense, that allowed for a better understanding of the tool's capabilities and limitations, which in turn made the mockup more realistic and viable.

Step 3 – The editorial team leader will be the main, and at first the only user of the dashboard, and through the interviews and forms conducted with him, it was concluded that he prefers a dashboard with pull scenarios. He prefers having a lot of information available to him, so he can periodically, but regularly invest time and effort into analysing and exploring the data, to reach meaningful conclusions that improve his decision making and his guiding of the team. Thus, the dashboard's design must be clear, visually pleasing, and effortless to explore, filter, and customize. This is also why the number of chosen KPIs was not as reduced as it could have, especially when we take the current literature's parsimony suggestions into account, but an effort was still put into selecting the truly key indicators.

There may be important indicators that the user does not value highly or fails to analyse at first, which was identified in the dashboard feedback session.

The possibility of applying the mentioned dashboard capabilities was evaluated with the company in an interview, by assessing the potential benefits of implementing them, and the company's IT capabilities to do it.

- Notifications and alerts: when certain indicators present values that require action these work as a push mechanism to request analysis from the users. The IT team guaranteed that this possibility would be possible, and since it is a key feature to guarantee that analysis is conducted at key moments, the KPIs that the user considers to be enhanced through adding notifications and alerts to it should have this feature implemented.
- Benchmarking: external benchmarking was considered impossible to introduce, excluding simple indicators, like sales, that the company through consulting services on their market and competitors has yearly access to through purchase. However, internal benchmarking as in comparing current to past periods' numbers is highly valued by the company, as clarified previously, and will be attempted for all KPIs with which it would be relevant.

- Scenario generation: including this option in the dashboard was evaluated, but the conclusion was that it was not worth the effort required to explore it in this project. However, hypothetically and as an example, it could be explored by generating scenarios for reporting that is useful for strategy definition, like sales forecasts, by using their sales history, industry sales data, and even experts' opinions. In this case, other indicators like Concurrent vs Non-concurrent Revenue could be key, as they help identify trends that should not be ignored.
- Dashboard tailoring: this option was considered by exploring offering alternate views for different editors, but the team prefers every user to have access to the same data and information, with the previously mentioned drill downs through filters (for example, sales per editor, or per client). This could be useful as their information and data needs differ due to them not editing the same content and themes and facing different points of potential improvement in their daily operations.

Step 4 - The dashboard is made up of 4 main “cubes” of data. The Sales (Financial), Operational, Performance, and Client (Customer) data, through which the user can easily traverse.

Every screen has a date selector and a home button to return to the main page from where the user can access the four cubes. The positioning of the most important components of the screen are positioned to the left and top, when possible. Colors have meaning and are consistent. Easy navigation and exploring between screens were valued.

The mockups of the first version of the dashboard are represented in the appendix F. They were designed with uizard.io and canva.com, and through the first, a functional system was created, that allowed the user to interact with the screens, navigating through the dashboard freely. The goal of this dynamic mockup was to simulate the user's interaction with the dashboard as accurately as possible, to maximize the learning potential of the usability testing session, and consequent improvements to the dashboard.

- Sales cube: this screen contains the value of current day's Sales of the team, its comparison to the previous period, a line chart with their Sales in quantity and another in value (€) over time, the value of the % of Sales that are “New Arrivals”, a button to show a line in the aforementioned charts with it, the value of its comparison to the previous period, and finally a pie chart with a drill down of the sales per client.



On the bottom right of the screen, there are 3 buttons to drill down the data per editorial label, per editor, and per client. This is done to understand what label and what individual editor is fulfilling or failing sales goals and editing winning products, and to follow the client's interest and demand for the team's products.

The first drill down replaces the 2 sales line charts, with a scatter plot that shows each editorial label's sales quantity and value (€), with each one color coded, while the second one replaces the charts with a bar chart that displays each editor's sales in quantity and another whose sales are in amount (€). For both drill down options, if selected, the % of Sales that are "New Arrivals" is also represented in the scatterplot, and in the bar chart as bars stacked on the original sales bar, and for all the options, the pie chart shows the filtered sales according to the selected drill down.

- Operational cube: this screen contains the value of the current day's Stocks, and the value of the current day's Production Costs, both with a comparison to the previous period. It also contains 2 line charts of the team, the first with a line for the Stocks and another for the Production Costs evolution over time, and the second with the Ratio of Obsolete Inventory. On the bottom right the same 3 drill down selectors are once again available, to understand the reasons and explanations for shifts in stocks and production costs, and uncover areas that cause increases to the inventory that is obsolete, so positive change can be enacted, and if they are selected, the data in the KPI values and the graphics change.
- Performance cube: this screen contains a table whose rows of its first column display the editorial label's name, and 3 KPIs in the following specific order, from top to bottom, and from most to least important: Edit Time to Market, Edit Cost / Revenue Ratio, and Edit Cost Variance.

In the table's columns, the measures of the 3 KPIs are displayed for each editorial label. For each value (monthly by default) the cell will be colored as green, grey, or red to represent an increase, maintenance, or decrease, respectively, in comparison to their previous period.

To the right of the table, there is a drill down for each editor available that displays their Edit Time to Market and Edit Cost / Revenue Ratio, while the Edit Cost / Revenue Ratio that each Client provides is available in the bottom right of the page.

- Client cube: this screen contains 2 line charts, the first displaying the % of Deadlines Met and their weekly evolution, and the second displaying the NPS for B2B and its monthly evolution for the general team. A button to the left of the graphs allows for a drill down for each editor and each editorial label, with the first only affecting the % of Deadlines Met, and the second involving both graphs. The lines in the graphs will each have a distinct color to identify more easily what they're representing.

Step 5 - Usability testing was conducted remotely through a Microsoft Teams session. It was recorded, with the participant's consent, so detailed posterior analysis could be done, to gather feedback and adapt the dashboard to the user's personality and way of decoding data. The editorial team's leader was the only participant in the usability test, which is not usually desirable since the participant's biases and individualities will more strongly affect its outcome. However, in this case, it is not problematic, since the participant will be the main and likely only user of the dashboard, at least at first, so its molding to their preferences is positive.

The participant's performance of the tasks helps identify issues with the dashboard, that in conjunction with the gathered suggestions were evaluated to be introduced as corrections. The scenario at hand was a simulation of the participant's KPI analysis process, and the task selection for the participant to execute was:

1. Perform daily financial and stocks analysis.
2. Perform the analysis of the team's performance in their processes and results.
3. Perform the analysis of the client's assessment of performance and product delivery quality.

The session was recorded, and so was the time required to complete a task, task completion rates, and the number and types of errors. After each task, the following questions were asked:

- What took too long to understand?
- Could you take conclusions and make decisions that you feel could be acted upon?
- What was illogically placed or hard to find?
- What is missing?
- What needs contextualization and/or explanation?
- What other dates or periods should be available?

The dashboard segments whose tasks have the worst results in these aspects were worked upon, and suggestions were recorded and counted to assess their importance in the participant's mind.

During the usability test, no task presented relevant issues in terms of task completion type, rate, and errors, but criticisms were made regarding the relevancy and adequacy of a segment of the data or its presentation. Moreover, they felt that no contextualization or explanation was required inside the dashboard, and especially knowing that it will only have, at least initially, one user, the only few explanations can be featured in the report provided to the company for implementation of the dashboard. User individualities for its implementation are also included in it, like the participant's preference for more horizontally elongated graphics. In general, the efficiency, user friendliness, location of items, color coding, and logic of the dashboard screens was highly regarded and appreciated by the participant. However, they reminded that more coherence and consistency could be achieved with the types of graphs chosen, and with the way the color coding is implemented, for example in the background or font color changes. Finally, the participant approved the selected time periods but also called attention to the importance of looking over annual periods, which is an issue in the Qlik Sense tool in and of itself.

The participant's main corrections were the suggestion of not using line charts when there are no comparisons being made between indicators (represented by different lines) in the same chart, but instead using bar charts, even more so since the participant values them more from a personal preference point of view. Moreover, they prefer less variance of the type of data visualisation methods employed, as they feel it results in a more fluid and comfortable analysis experience. They also made corrections to certain words that were inadequate for the industry. Finally, even though they value the comparison of KPIs to their previous period value, they value the comparison of a KPI's number to the one in the business plan or budget even more, and they want both to be available.

Regarding each of the data visualisation cubes:

- Financial cube: like it was previously mentioned, the participant prefers bar charts instead of line charts, so when possible they were replaced.

Even though the % of New Arrivals was selected as a KPI, it ended up being implemented as a drill down of the Sales KPI, which was very positively received, and so was the filter to compare it to the normal sales value in the charts. Moreover, they want it to be extended to drill down the Sales into even more book edition types, like "Coeditions", "Reeditions", and "Books under budget". Selecting any of these options

makes it so it is represented on the chart, but if another filter is selected, the original one is replaced, resulting in a rich and in-depth analysis of the team's sales.

The sales per client screen was valued and relevant, but the participant believed that the pie chart that represents them was unnecessarily represented in the other financial screens, as its representation of the client screen was enough. Instead, a Top 10 of Book Titles Sold in the selected period of time for the general team was suggested. The Top 10 of Book Titles Sold was added as a KPI, being present in the general screen, and the drill down screens per editor and editorial label

Specifically in the sales per client screen, the original pie chart remains with the same drill down per client available when the user clicks on a client of the pie chart. Finally, the NPS for B2B KPI was added to the screen, and so was the line chart (originally in the client cube) that drills down the NPS for B2B for each editor, when the user clicks on the KPI value.

- Operational cube: the participant would rather have 2 separate charts dedicated to Stocks and Production Costs respectively and below them the Ratio of Obsolete Inventory. The selected drill downs and the aforementioned additions of book type drill downs were approved.
- Performance cube: the participant felt that the drill down per editor was relevant, but that the one per client was not. They added that the former could even be expanded for all 3 performance KPIs. Thus, the conclusion of removing the right side of the screen drill downs was made, instead including a drill down option of doing so per editorial label or editor for the entire table. This option alters the first column rows of the table to contain either the names of each editor or editorial label, and consequently the other values, but maintains the KPIs at the top of the page as general values for the whole team.

The client cube was removed. The participant did not find any drill down for the NPS for B2B useful or possible, and found the % of Deadlines Met irrelevant, as the editorial industry is extremely fast paced, and deadlines are often failed. However, it is not necessarily due to poor performance, as many deadlines have to be failed or delayed to meet others or even different objectives. They also mentioned that it did not actually fit in with this dashboard and its purpose, as they did not see it as sufficiently business oriented. A table with the corrected KPI relationships is available in the appendix H.

The NPS for B2B indicator was shifted to the financial/sales cube since it was not worth it to have a screen reserved for only this KPI, and due to the fact that it is connected to clients, just like the sales per client screen. In the future, if the team follows the suggestion of gathering more customer focused KPIs, this indicator should be shifted to a customer or client screen of data.

It is important to highlight that the respondent of the questionnaires, when assessing the relevance of candidate KPIs, initially approved indicators that they later identified as being of lesser importance, like the removal of the % of Deadlines Met KPI that contradicts their previous stance of approval for it. Moreover, the respondent prefers business-oriented metrics rather than worker performance-based indicators, but it should be recognized that performance metrics, despite not being directly aligned with business outcomes, play a crucial role in assessing the overall success of the organization. Therefore, they hold substantial value within the broader context of providing a comprehensive overview of team data.

These conclusions, corrections, and suggestions gathered in the usability test were taken into account and were implemented as much as possible. The major changes are represented in the appendix G. The updated mockup was included in the report provided to the company to guide its implementation. It presents the selected KPIs (and the indicators that were not selected but have great potential), their definition, relationships, and calculations. It also communicates the importance of continuous setting and resetting of the indicators, and of applying alerts and notifications.

Finally, the mockup of the dashboard is accompanied by any necessary descriptions of its features, views and indicators, their periodicity, and their relationships.

Step 6 - The design of the final dashboard in Qlik Sense was attempted, but, unfortunately, the company did not have the availability to engage in this project at the time, since they were busy with the final steps of the development of their management program. To combat this, as mentioned in the previous step, a report was provided to the company with the guidelines to guide and accompany the successful implementation and adoption of the dashboard.

## 6 Conclusion and future research

The objectives of the research conducted in this dissertation were to develop a method for KPI selection and dashboard design, to apply and refine it in a Portuguese book editor and retailer. The method allowed for the identification of the team segment that would benefit the most from its application, and where its use case would be most fitting, which is crucial due to helping prioritize PMS improvements, leading to better resource allocation. Afterwards, a list of customized and adequate KPIs was developed, followed by a dashboard for its visualisation, employing these methods with the participation and engagement of the company.

The application of the methods was successful in answering and providing a solution to the research questions and objectives set for this dissertation, and hopefully it can be applied in other organizations to continuously improve their PMS and data analysis processes. However, these methods would benefit from more research, especially in environments where there are various users with different requirements and viewpoints, which makes the process more complex and less biased.

In the end of the project, it was understood that achieving truly customer focused KPIs is more difficult than it seems, because the managers and workers that are inside the company seemed to value financial, operational, and performance indicators more. Moreover, it is challenging to find indicators that are key and that truly represent the customer's assessment of the company and its products/services.

The reliability and accuracy of questionnaires (that include both quantitative and qualitative questions) proved to be poor, as it led to contradictions in the gathered information. Thus, interviews should always be prioritized as they make the respondent more attentive and considerate of their opinions. The creation of mockups and their usability testing was extremely beneficial, as it more accurately communicated the intended selection of KPIs and dashboard design to the user. Thus, the project was improved greatly, due to the more accurate and useful feedback received.

Identifying the external customers and their customer journeys was not very relevant in this case, as a client drill down would always be made available and because overall quality is the main factor the editorial team can control to affect the customer journey. However, in other organizations, especially the ones that function as B2C, it could be.

The "SMART" principles were incredibly useful to understand which indicators are truly valuable and fitting, but the "attainable" principle could be considered counterproductive, as

some indicators may be important, but since they require specific work to have them become available, they may be disregarded as they are not attainable at the time.

Gathering information regarding the selected segment and its user requirements were, logically, the most important steps of the selection process. However, it is important to note that the list of KPIs that are selected should not be completely based on the users' desires, they must be sourced from the state-of-the-art suggestions for that context. They may even be misguided or misinformed, which could derail the entire process, but on the other hand, if the user is informed and qualified in data analysis and PMSs, the KPI selection and the dashboard design's overall quality and suitability will be benefited. It is also important to note that since the methods were developed by employing direct contributions from state-of-the-art research, their application not only confirmed its usefulness, but also affirmed the significance of the cited authors' contributions in its creation.

Other matters that require more research are the evaluation of the KPIs depending on if they allow certain features over others, which would benefit from an assessment of the dashboard applied in practice at a later time, as the features that were considered more important, may be in reality less so than others, and vice versa. Other features require implementation in different organizations, as they were not implemented in this case.

Further research and testing should also be employed to apply this method with other PMS tools, especially Grafana. Potentially, the method may be better suited for other tools, or improvements may even be possible after their hypothetical application. Continuing research into understanding practices that promote the achievement of extremely simplistic dashboards that truly promote "at a glance" analysis is also important.

Repeating these methods at an organization with very high investment in their PMS and data analysis would clearly put it to the test. After all, the more the methods are repeated and applied in different types of organizations, the more reliable it becomes and the more it can be improved. Consequently, it becomes pertinent to examine whether any other modifications to the methodology are warranted to accommodate these considerations.

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**APPENDIX A: Display KPIs, and if they contain valued features, if selected, and respective calculation.**

Indicators with an asterisk (\*) next to their mark for the “Customer Focus” aspect are indirectly focused.

Customer	Performance	Operational	Financial		Indicators	Mandatory through Requirements	Real Time	Drill Down	Customer Focus	Benchmarking	Predicting	Target Definition	Selection	Calculation
			Sales (quantity & value)	Stocks										
						X	X	X	X	X**	X	X	YES	Sum of daily sales in revenue (€), and in quantity of products sold
						X	X	X	-	X	-	X	YES	Sum of daily stock of products in storage
						X	X	X	-	X	-	X	YES	Sum of daily production costs in euros (€)
						-	-	X	-	X	-	X	YES	(Inventory classified as obsolete divided by the total inventory (stocks) in a month) * 100
						-	-	X	X*	X	-	X	YES	(Number of "New Arrival" products sold divided by the total number of sales in a week) * 100
						-	-	X	-	X	X	X	YES	(Sum of costs attributed to book editing divided by the sales revenue in a month) * 100
						-	-	X	-	X	-	X	YES	(Actual cost of book editing - Budgeted cost of book editing) / Budgeted cost of book editing * 100
						-	-	X	X	X	X	X	YES	Sum of the time it takes from the moment a book edition is accepted until it is made available for ordering / Number of titles published
						-	-	X	X*	X	-	X	YES	(Number of deadlines met divided by the total number of deadlines to meet) * 100
						-	-	X	X*	X	-	X	NO	NOT SELECTED, similar purpose to sales and % of Deadlines Met
						-	-	X	X	X	X	X	YES	% of promoters minus % of detractors (derived from surveys)

**APPENDIX B: The relationships between the initial selected KPIs table.**

	Sales (quantity & value)	Stocks	Production Costs	% of New Arrivals Sold	Edit Cost / Revenue Ratio	% of Deadlines Met	Ratio of Obsolete Inventory	Net Promoter Score for B2B	Edit Cost Variance	Edit Time to Market
Sales (quantity & value)		X	X	X	X	X	X	X		X
Stocks	X		X		X	X	X	X		
Production Costs	X	X		X	X		X	X	X	
% of New Arrivals Sold	X		X					X		X
Edit Cost / Revenue Ratio		X	X			X	X			X
% of Deadlines Met	X	X			X		X	X		X
Ratio of Obsolete Inventory	X	X			X	X		X		
Net Promoter Score for B2B	X	X	X	X		X	X			X
Edit Cost Variance			X							
Edit Time to Market	X			X	X	X		X		

## **APPENDIX C: Description of the relationships between the selected KPIs.**

- 1) Sales:** They relate to each other and other KPIs widely, as, for example, increased Sales will increase Production Costs, and their Stocks will decrease, unless Sales is used as a predictive indicator, in which case the Stocks will be preemptively increased. Moreover, an increase in Sales may be due to an increase in the % of New Arrivals Sold, the % of Deadlines Met, or a decrease in the Edit Time to Market, which in turn would affect the NPS results positively. Finally, if it enhances economies of scale. the Production Costs' increases may be diminishing, which could improve the Edit Cost/Revenue Ratio.
- 2) % of New Arrivals Sold:** They are the key segment of the Sales, so an increase in "New Arrivals" sales will influence them, but it will also influence the NPS due to the clients' major interest in "New Arrivals" that prove to be successful and attractive to the final customer. They also may derive from faster a Edit Time to Market
- 3) Stocks:** They relate to the Sales as an increase in Stocks should be brought upon by an increase in these indicators or else it will deplete Stocks. Increasing Stocks makes it so there are more Production Costs, and if Sales do not follow the Edit Cost / Revenue Ratio would be affected. It could also be due to clients' dissatisfaction, perhaps due to a decrease in the % of Deadlines Met, which would affect the NPS for B2B negatively. They also relate to the % of Deadlines Met as more stocks make it so a failed order due to no product availability is unlikely.
- 4) Production Costs:** They relate to Sales, and consequently, NPS, for the previously mentioned reasons, but more "New Arrivals" sold requires more production leading to an increase in Production Costs. Costs increases may also lead to an increase in the price of the products, which in turn would reduce Sales and the satisfaction of the clients, which in turn reduces the NPS score. The Edit Cost / Revenue would also rise, unless costs rise proportionally to Sales. Finally, if stocks are increased it will be more costly.
- 5) Ratio of Obsolete Inventory:** They relate to Sales, Stocks, and Edit Cost / Revenue as a high Ratio of Obsolete Inventory may be due to unexpectedly reduced Sales, thus increasing the stocks being held and the costs of editing books that do not bring in revenue. They also relate to the NPS for B2B as a low score could lead to less sales of their products, and to the % of Deadlines Met, as unmet deadlines affect the previous indicators.
- 6) Edit Time to Market:** They relate to Sales, % of New Arrivals Sold, Edit Cost / Revenue Ratio, % of Deadlines Met, and NPS for B2B, as new edits that provoke demand being developed and delivered to clients faster or slower will improve or worsen the results of these KPIs, respectively.
- 7) Edit Cost Variance:** They only relate Production Costs due to being a part of the editing costs, and because this KPI is focused only on budgets and costs themselves, without outside interference.
- 8) Edit Cost / Revenue Ratio:** They relate to Sales and Production Costs, due to the economies of scale efficiency changes that were previously mentioned, as they will not alter the ratio proportionally. They relate to Stocks, Edit Time to Market, and the Ratio of Obsolete Inventory as an increase in these worsens the Edit Cost / Revenue Ratio, and the % of Deadlines Met as unmet deadlines will not result in revenue.

**9) % of Deadlines Met:** They relate to the Sales, Stocks, Ratio of Obsolete Inventory, Edit Cost / Revenue Ratio, and NPS for B2B as unmet deadlines do not realize in a sale, thus contributing to worsening the other referenced KPIs. Longer Edit Time to Market will make it more difficult for deadlines to be met.

**10) NPS for B2B:** As mentioned in the previous KPIs, they relate to many of the KPIs, as they can, directly or indirectly, promote positive or negative changes in the client's assessment of the service they receive, its quality and value (see table below).

## **APPENDIX D: Other teams' influence in the customer journey.**

The Commercial, Marketing, and Logistics teams have a higher presence on the pre-purchase and purchase stages since they handle the business dealings and their fulfillment with the buyers. For potential new clients, the Commercial team analyses and negotiates their conditions to become their supplier of books, while current clients communicate their orders weekly so the company can fulfill them in time, be it regular orders and restocks, or specific individual customer orders.

Specifically, in the pre-purchase the Marketing team works on the company's social media, publications, interviews, and presentations with authors to make itself aware and attractive in the eyes of the final customer, and the Commercial team works with the retailers to better present and communicate the company's products in the stores.

**APPENDIX E: “SMART” evaluation of the candidate KPIs.**

		Indicators		Specific	Measurable	Attainable	Relevant	Timely	Periodicity
		Views							
Financial	Sales (quantity & value)	General	Editorial Label	X	X	X	X	X	Daily
			Editor	X	X	X	X	X	Daily
			Client	X	X	X	X	X	Daily
	Recurrent vs Non-recurrent Revenue	General & the 3 DDs		X	X	- *	-	-	-
	% of New Arrivals Sold	General & the 3 DDs		X	X	X	X	X	Weekly
Operational	Stocks	General		X	X	X	X	X	Daily
		Editorial Label		X	X	X	X	X	Daily
	Production Costs	General		X	X	X	X	X	Daily
		Editorial Label		X	X	X	X	X	Daily
	Ratio of Obsolete Inventory	General		X	X	X	X	X	Weekly
		Editorial Label		X	X	X	X	X	Weekly
	Inventory Carrying Costs		General		X	-	-	-	-
Inventory Cycle Time		General		X	X	X	-	-	-
Performance	N° of Days for 1st Edition Sale	Editor		X	X	X	-	-	-
	% of Coeditions	Editor		X	X	- *	-	-	-
	Edit Cost / Revenue Ratio	Editor		X	X	X	X	X	Monthly
		Editorial Label		X	X	X	X	X	Monthly
	Edit Cost Variance	Editor		X	X	X	X	X	Monthly
		Editorial Label		X	X	X	X	X	Monthly
	Edit Turnaround Time		Editor		X	X	X	-	-
Edit Time to Market	Editor		X	X	X	X	X	Monthly	
	Editorial Label		X	X	X	X	X	Monthly	
Customer	% of Deadlines Met	General		X	X	X	X	X	Weekly
		Editor		X	X	X	X	X	Weekly
	Error Rate	Editor		-	-	-	-	-	-
	Order Fulfillment Rate	Editor		X	X	X	X	X	Daily
	Net Promoter Score (NPS)	Editor	B2B	X	X	X *	X	X	Monthly
			B2C	X	X	-	-	-	-
Complaints per Invoice Rate		Editor		X	X	X	-	-	-



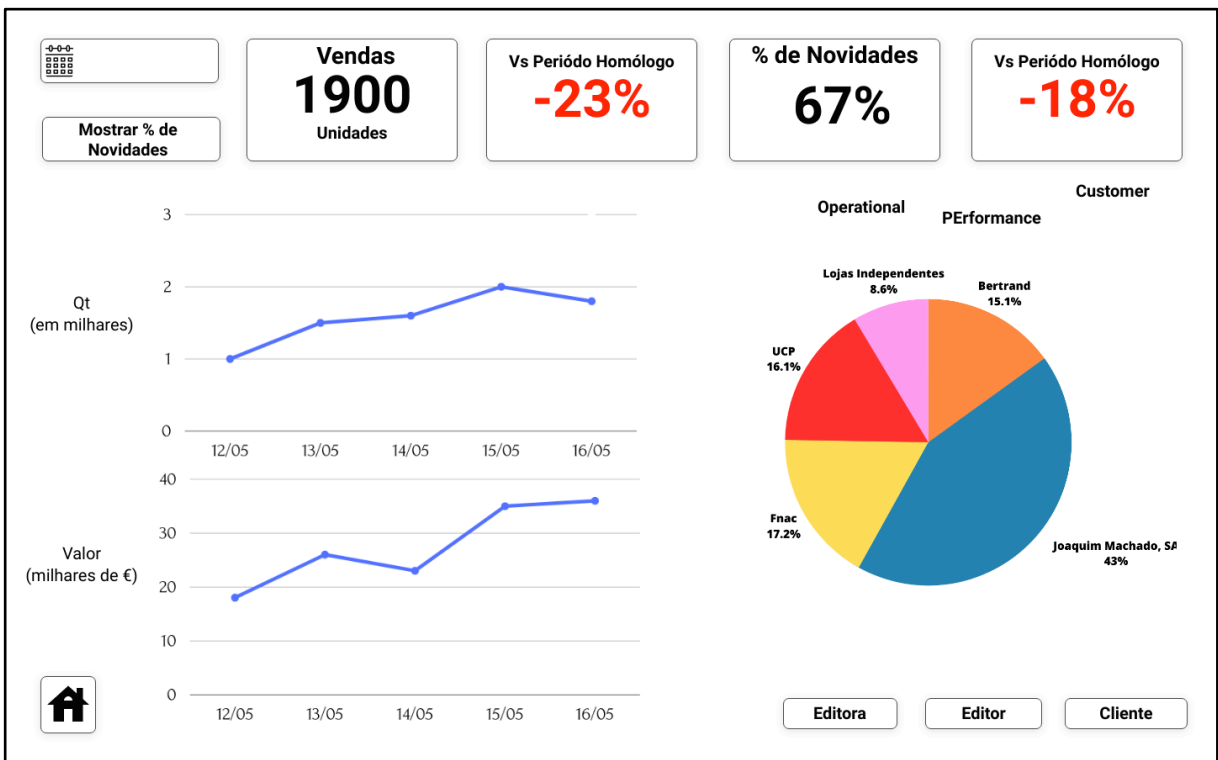
## APPENDIX F: Mockups of the designed dashboard for the selected KPIs.

Note that any data or names represented in this dashboard are entirely fabricated, and only used for more accurate representation and communication of the dashboard and its features. The mockups are in Portuguese which is the language that it will have in its implementation.

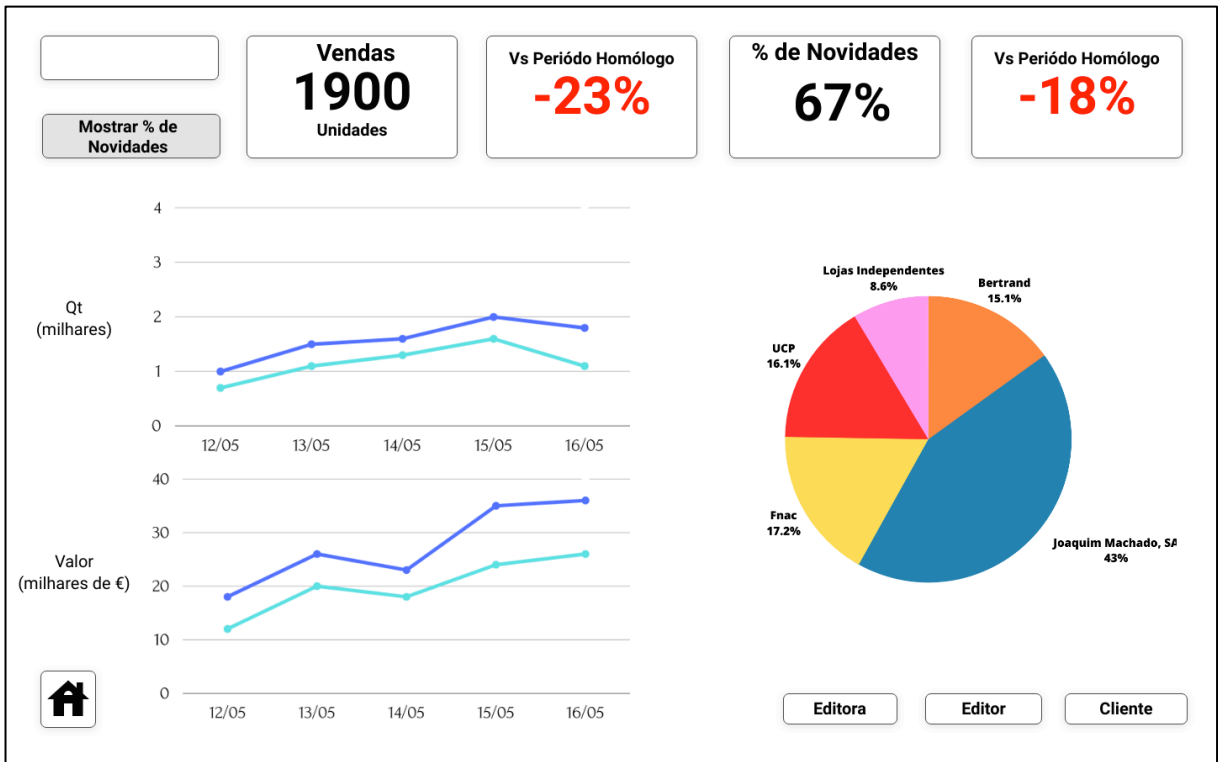
### Mockup page 1 - Home Page



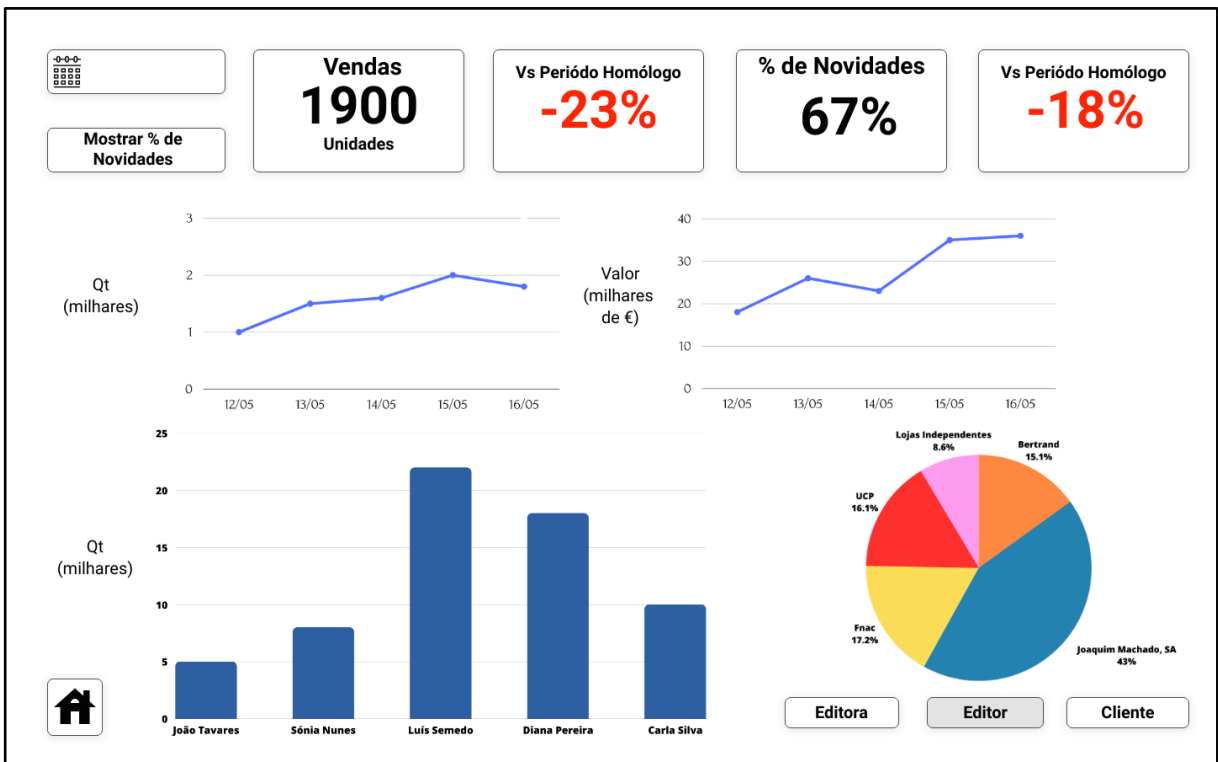
### Mockup page 2 - Sales Main Page



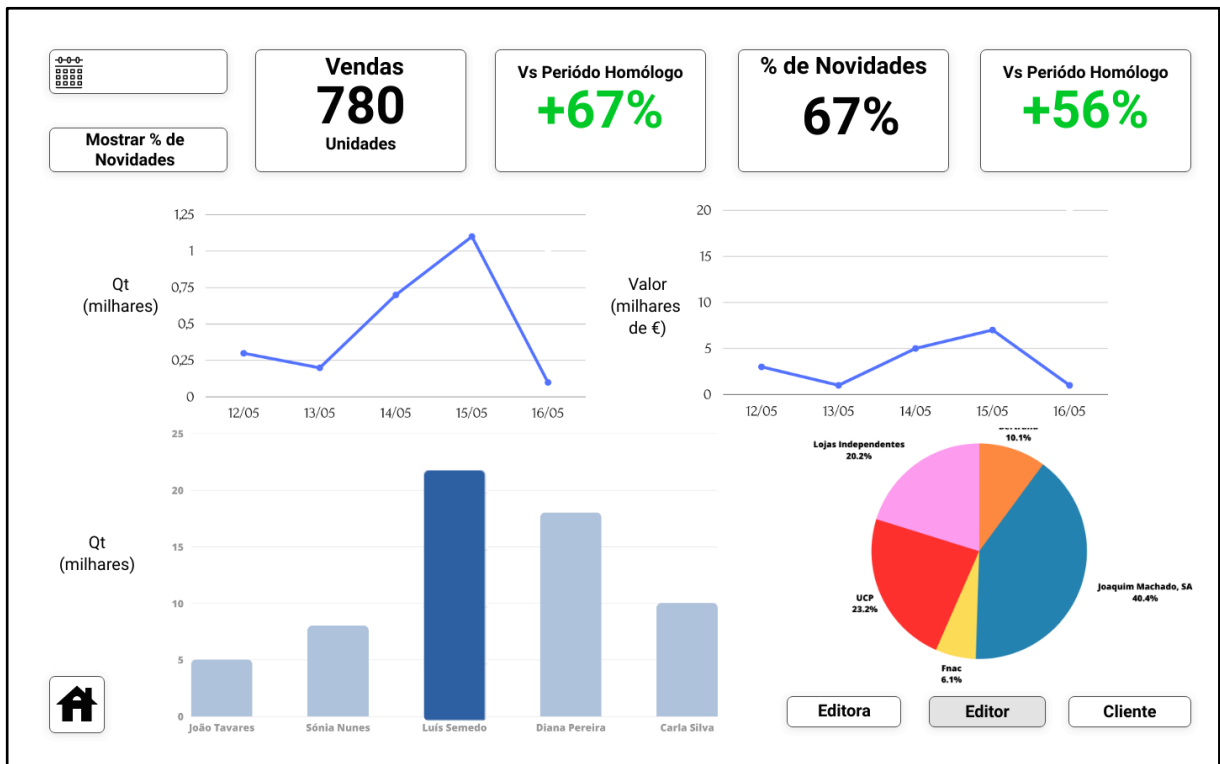
### Mockup page 3 - % of New Arrivals Sales Drill Down



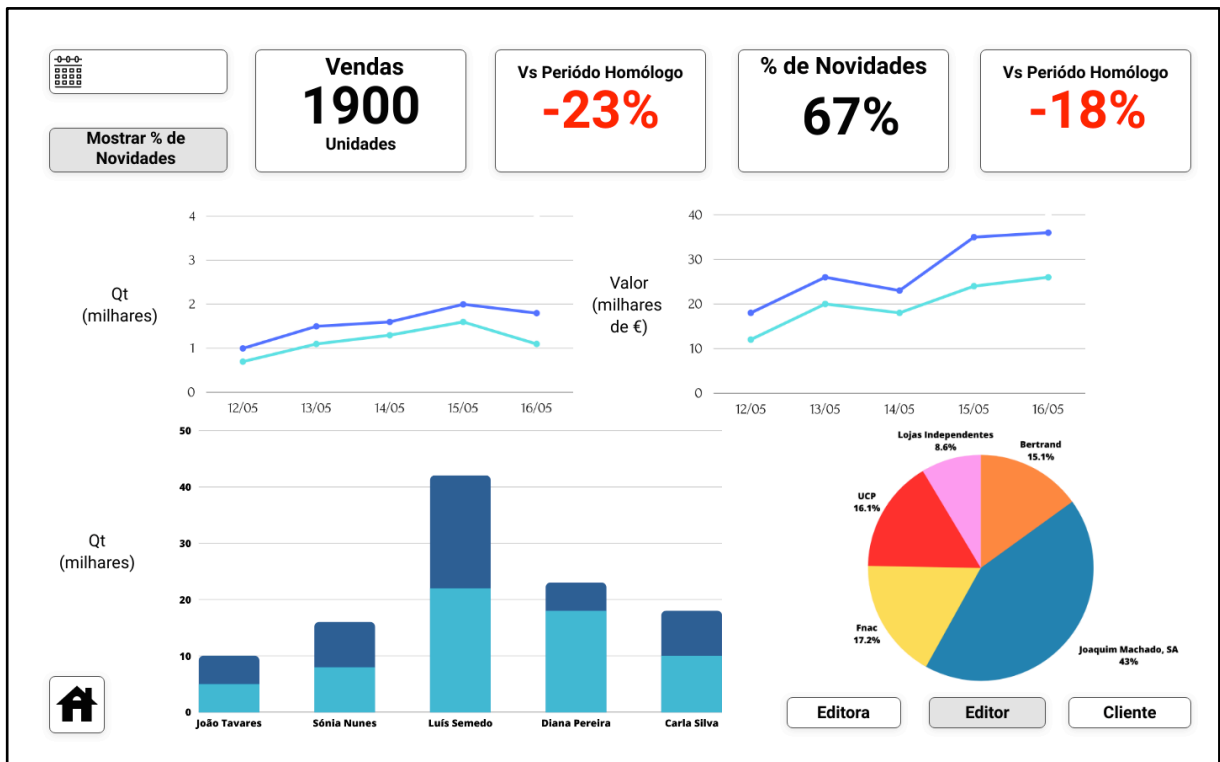
### Mockup page 4 - Sales per Editor Drill Down



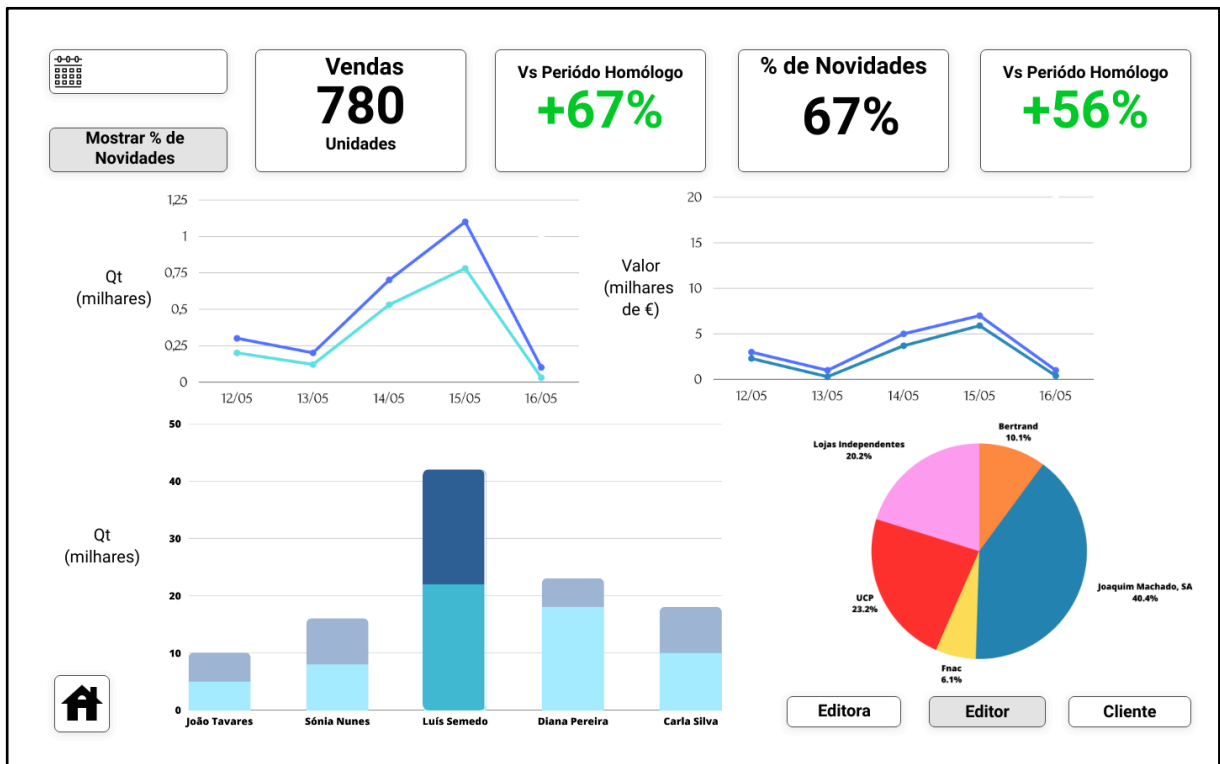
### Mockup page 5 - Sales per Specific Editor Drill Down



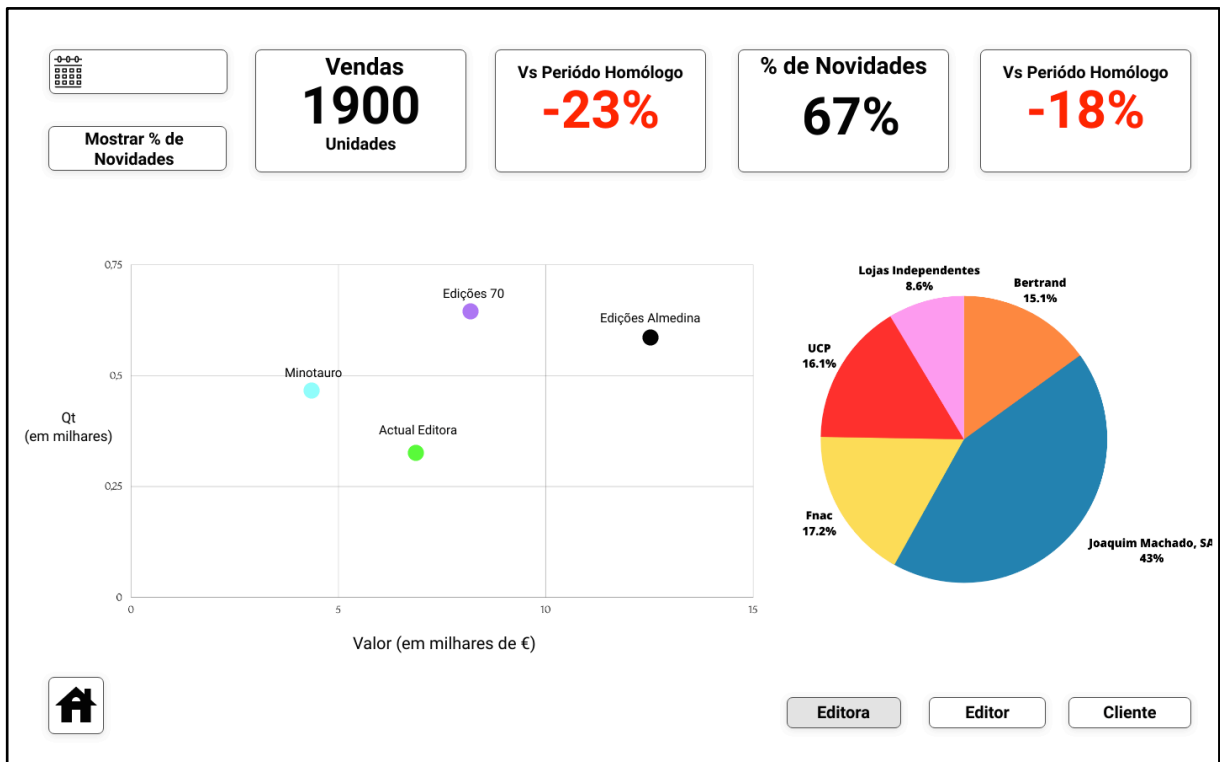
### Mockup page 6 - % of New Arrivals Sold per Editor Drill Down



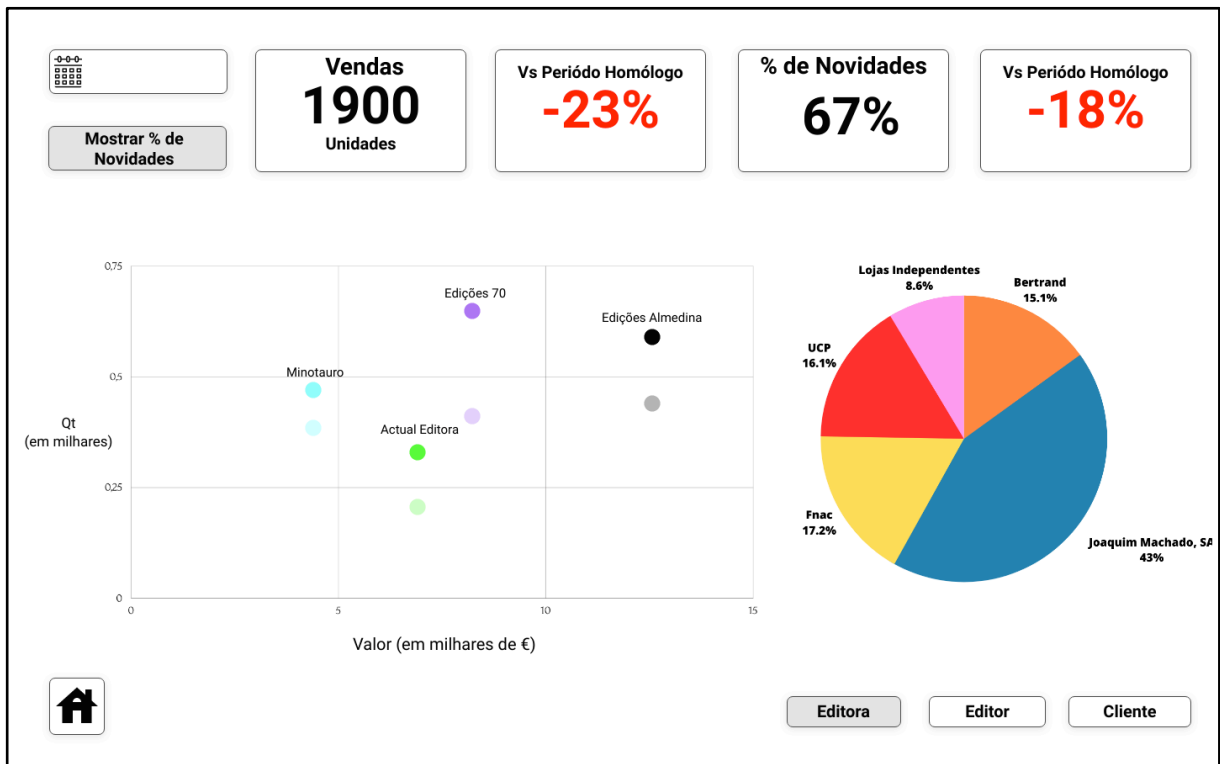
### Mockup page 7 - % of New Arrivals Sold per Specific Editor Drill Down



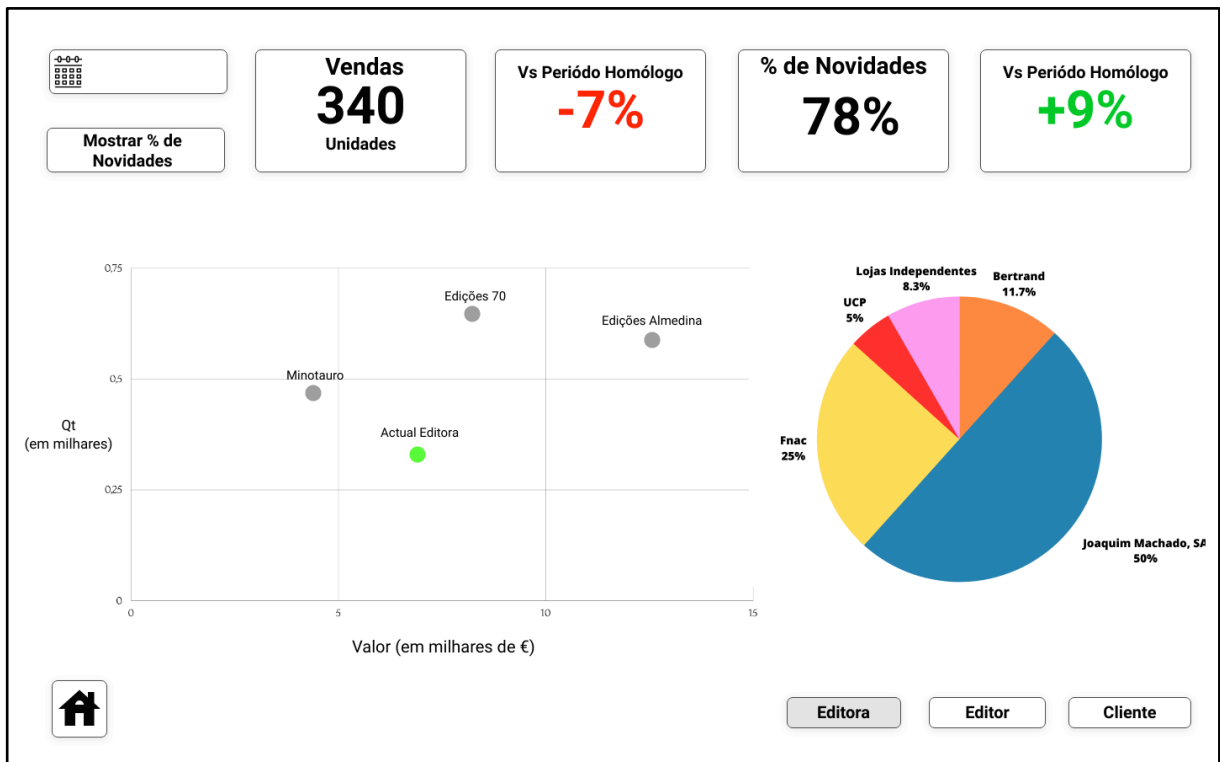
### Mockup page 8 - Sales per Editorial Label Drill Down



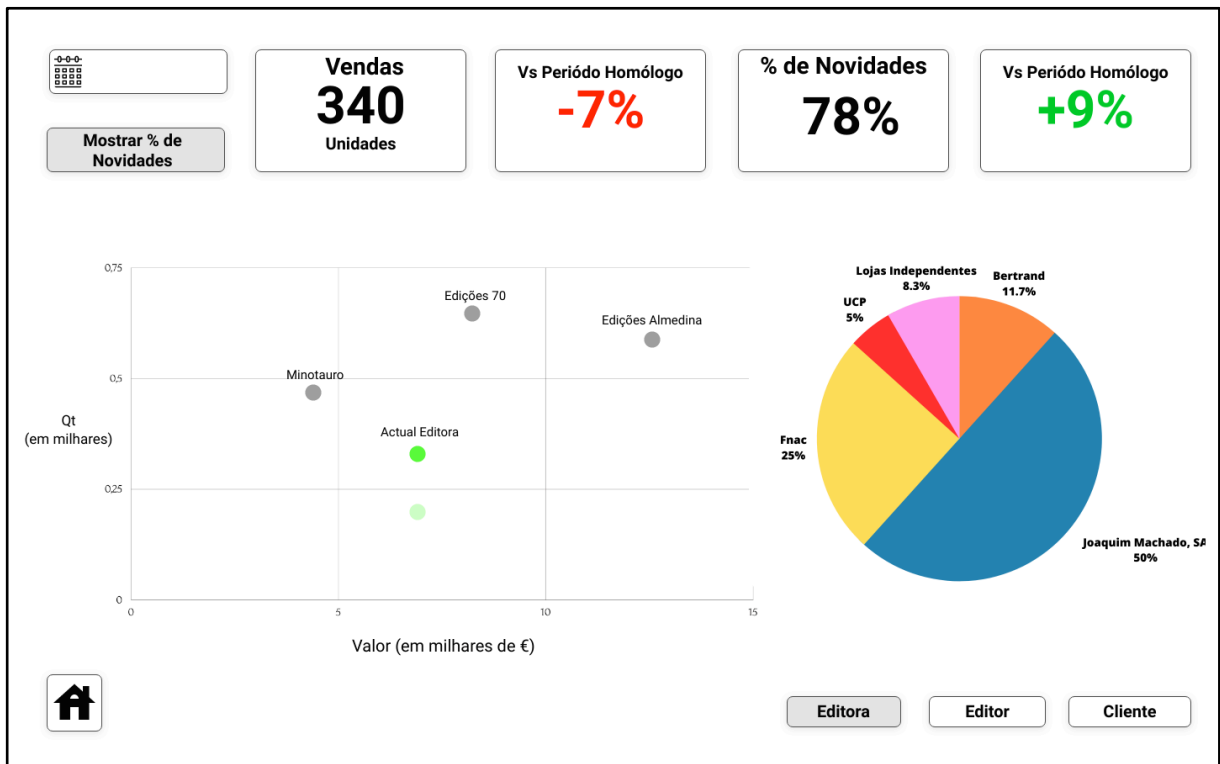
### Mockup page 9 - % of New Arrivals Sold per Editorial Label Drill Down



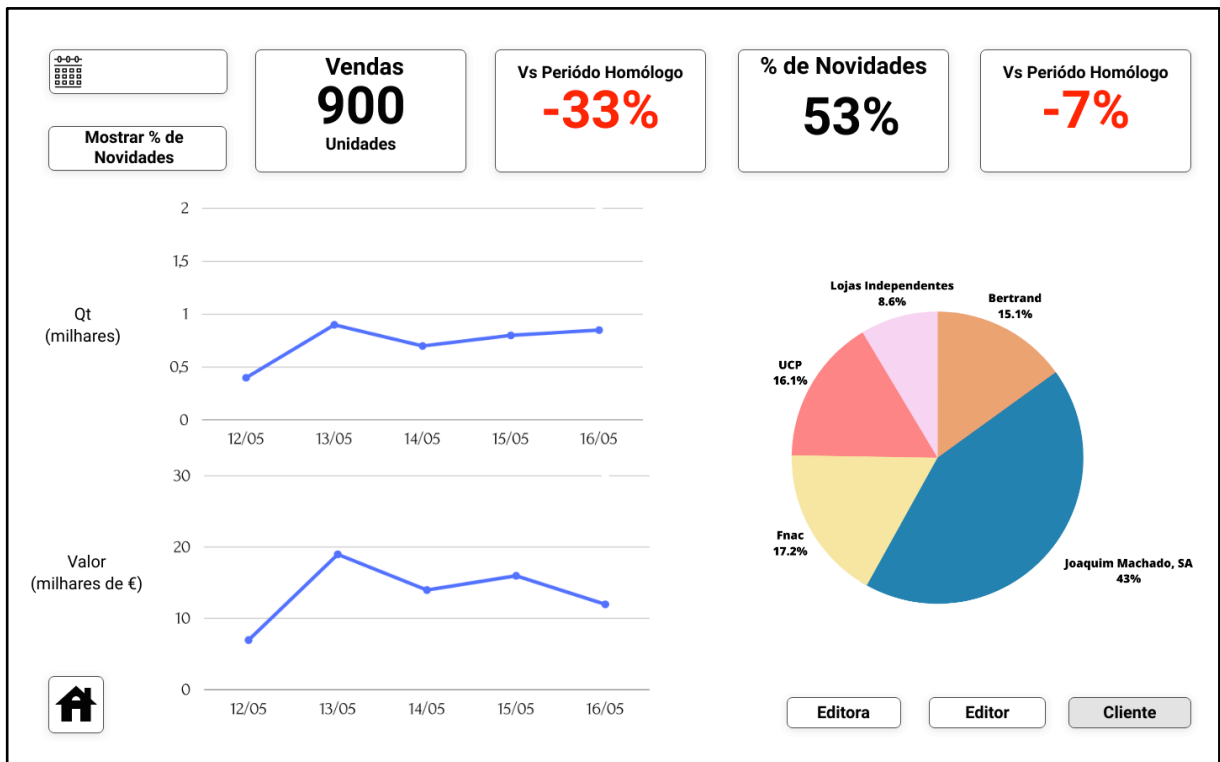
### Mockup page 10 - Sales per Specific Editorial Label Drill Down



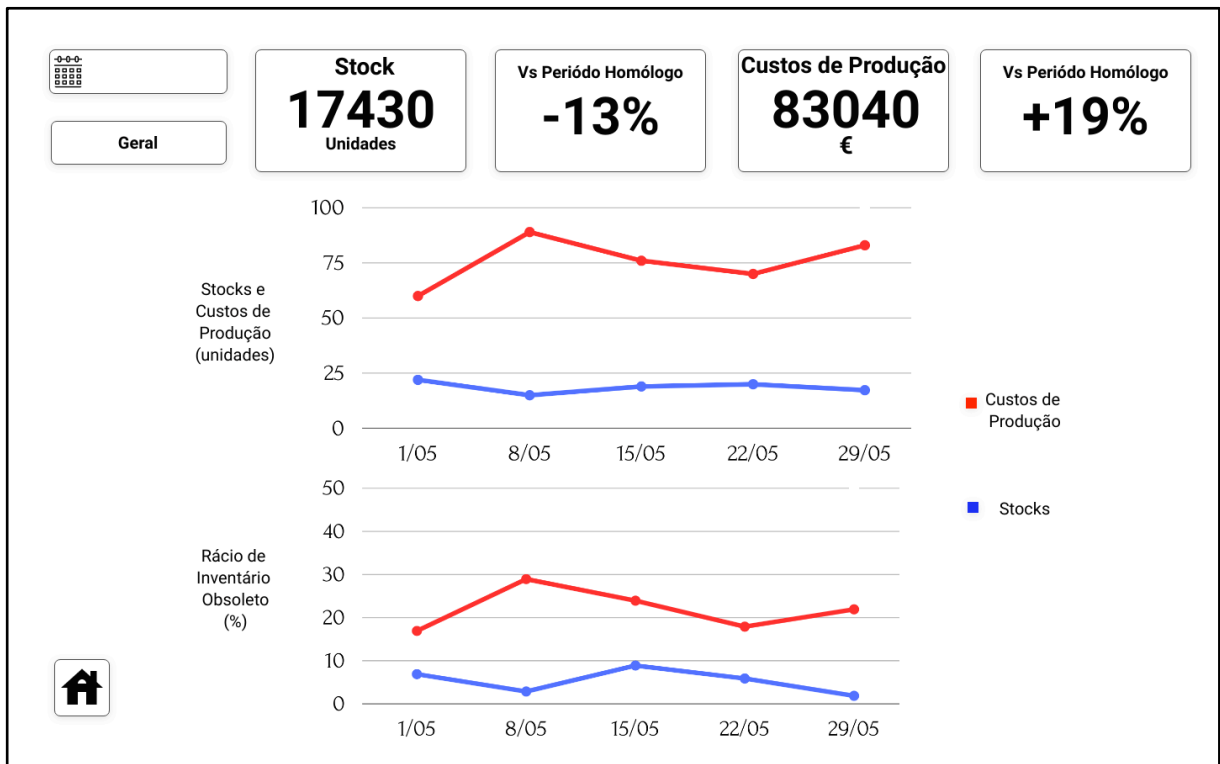
### Mockup page 11 - % of New Arrivals Sold per Specific Editorial Label Drill Down



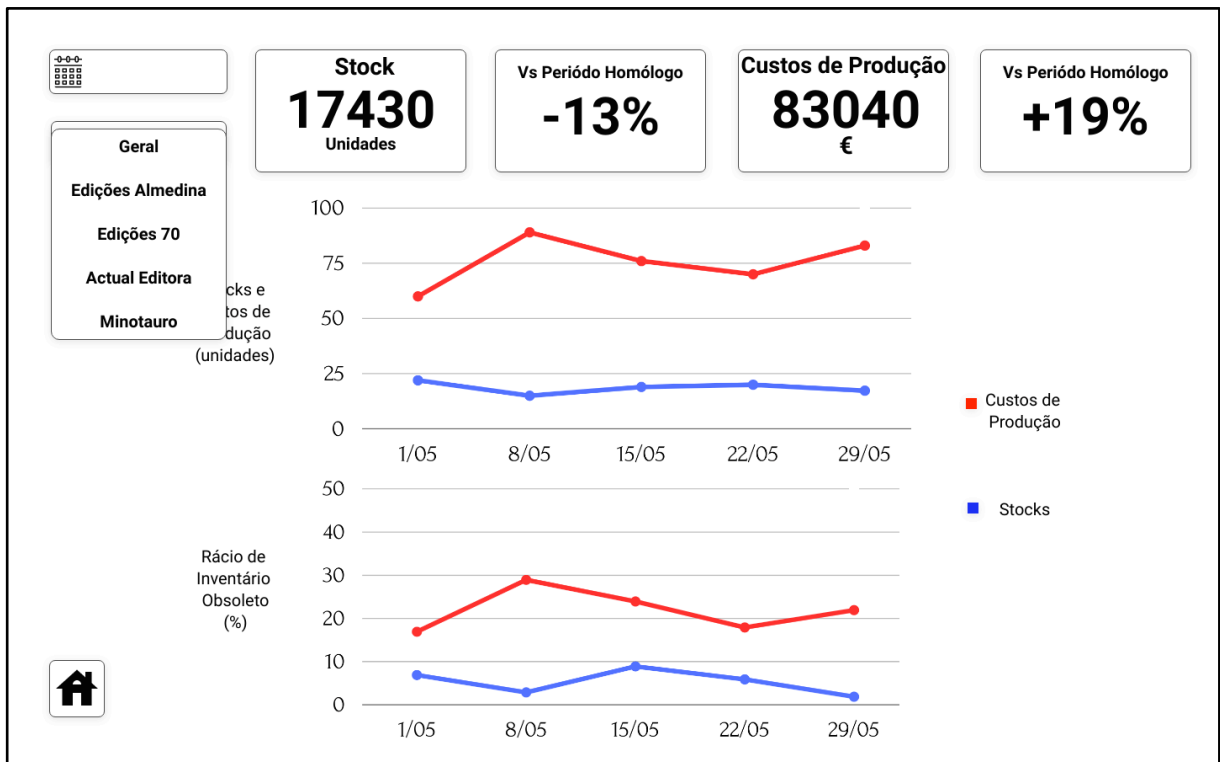
### Mockup page 12 - Sales per Specific Client



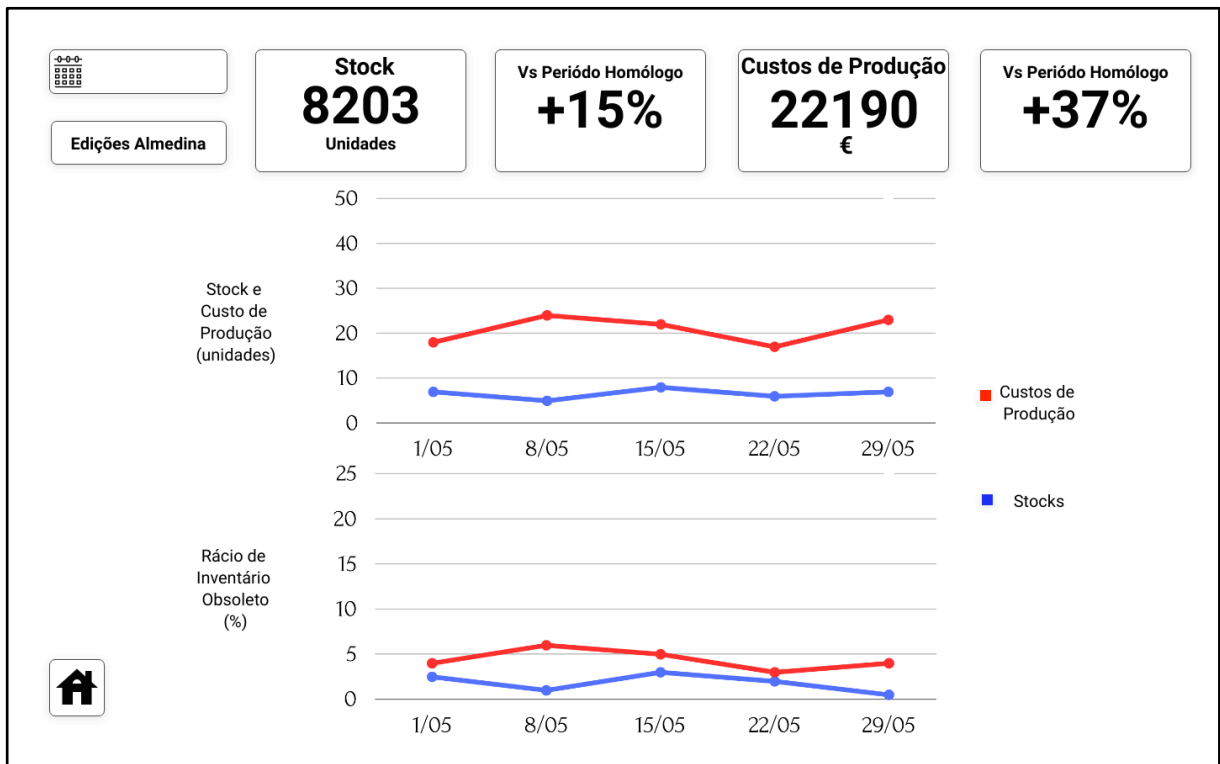
### Mockup page 13 – Operational Main Page



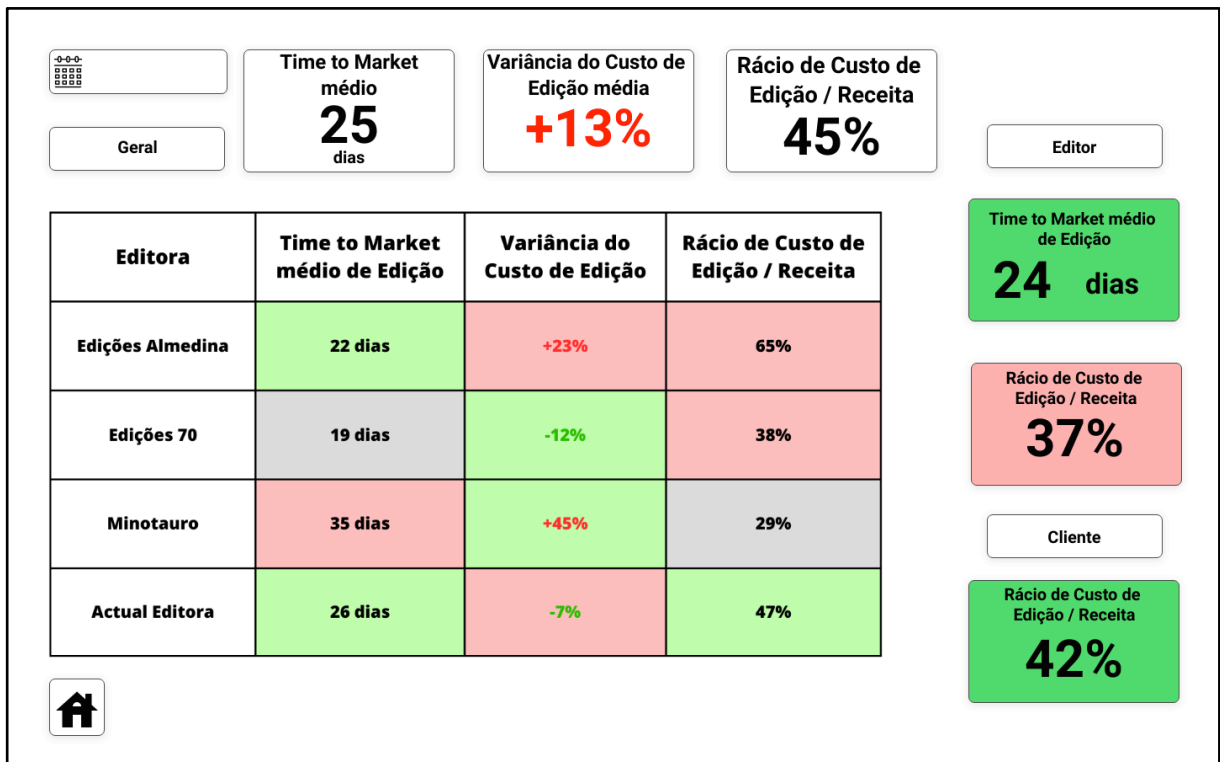
### Mockup page 14 - Operational Page Drill Down Selector



### Mockup page 15 - Operational Page per Specific Editorial Label Drill Down

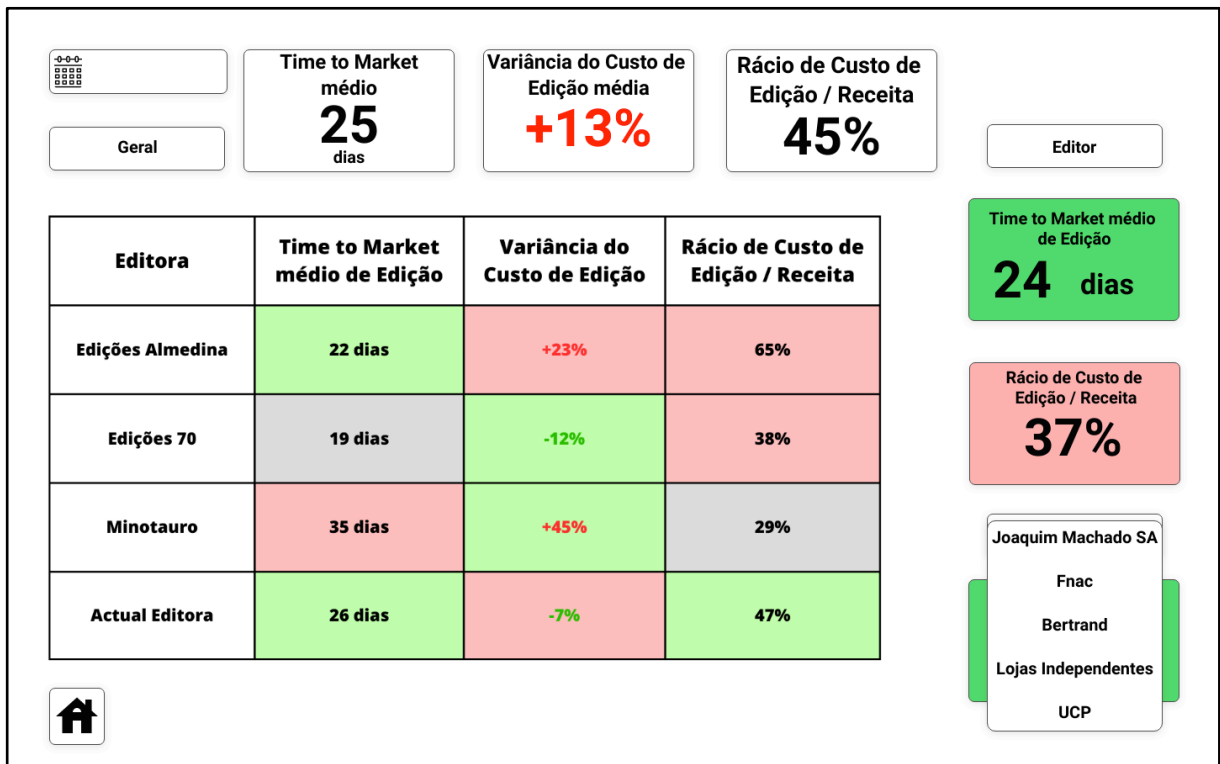


### Mockup page 16 - Performance Main Page

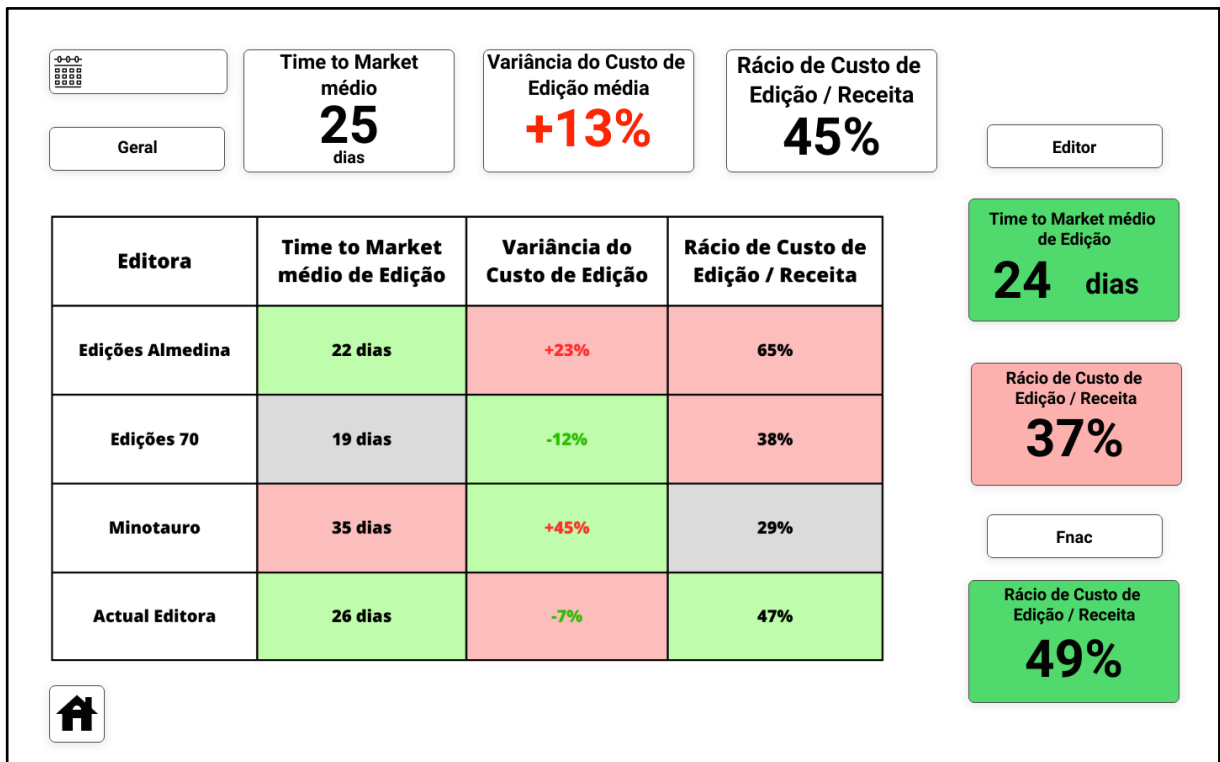




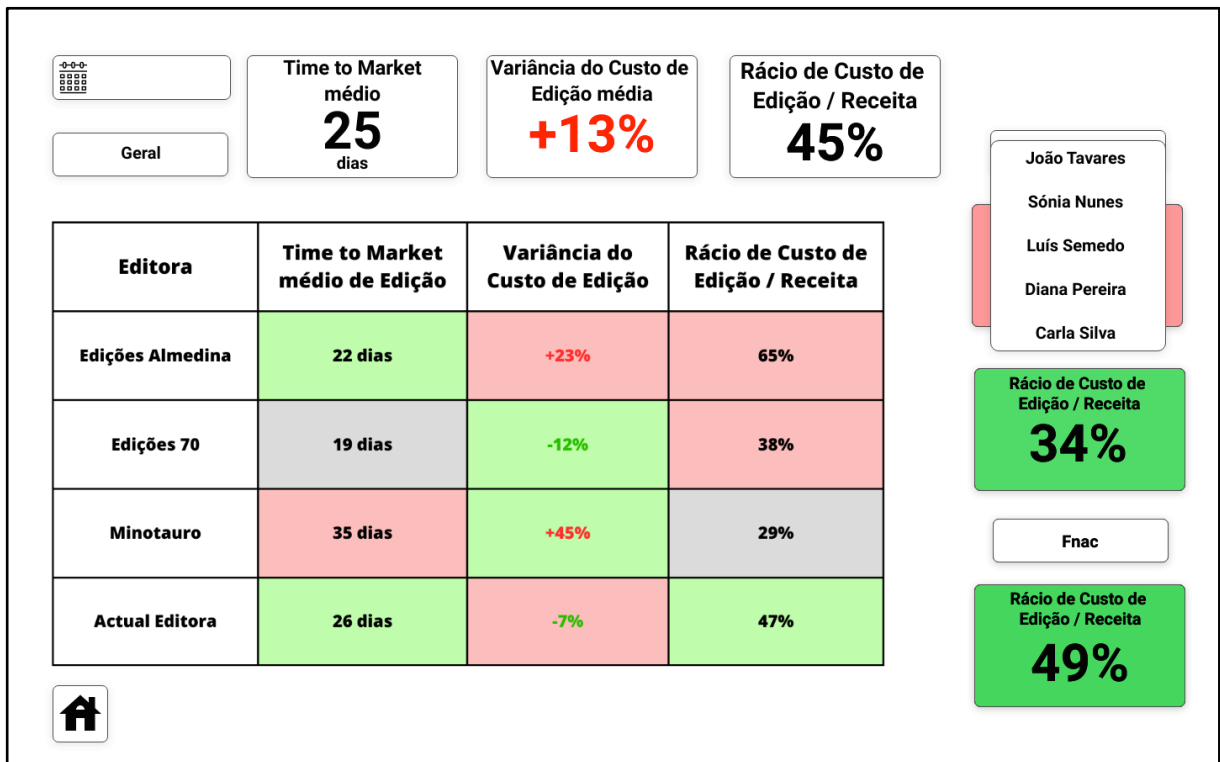
### Mockup page 17 - Performance Page per Client Drill Down Selector



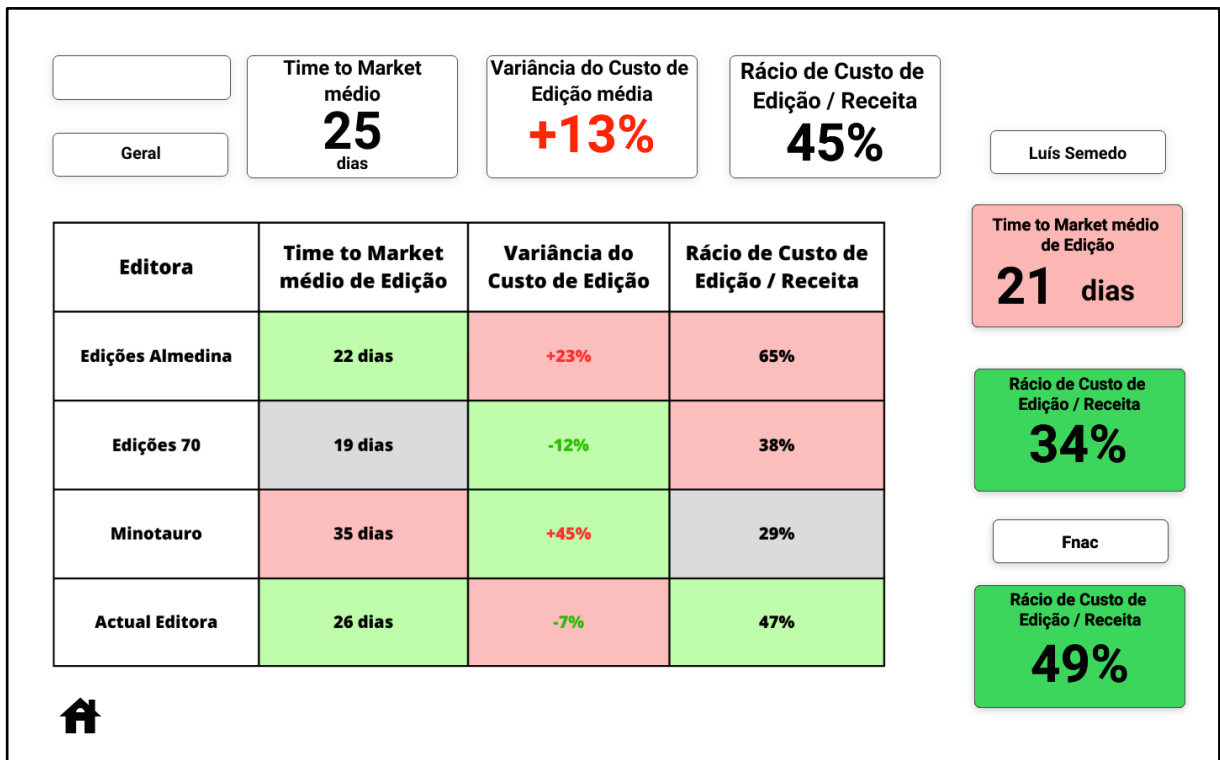
### Mockup page 18 - Performance Page per Client Drill Down



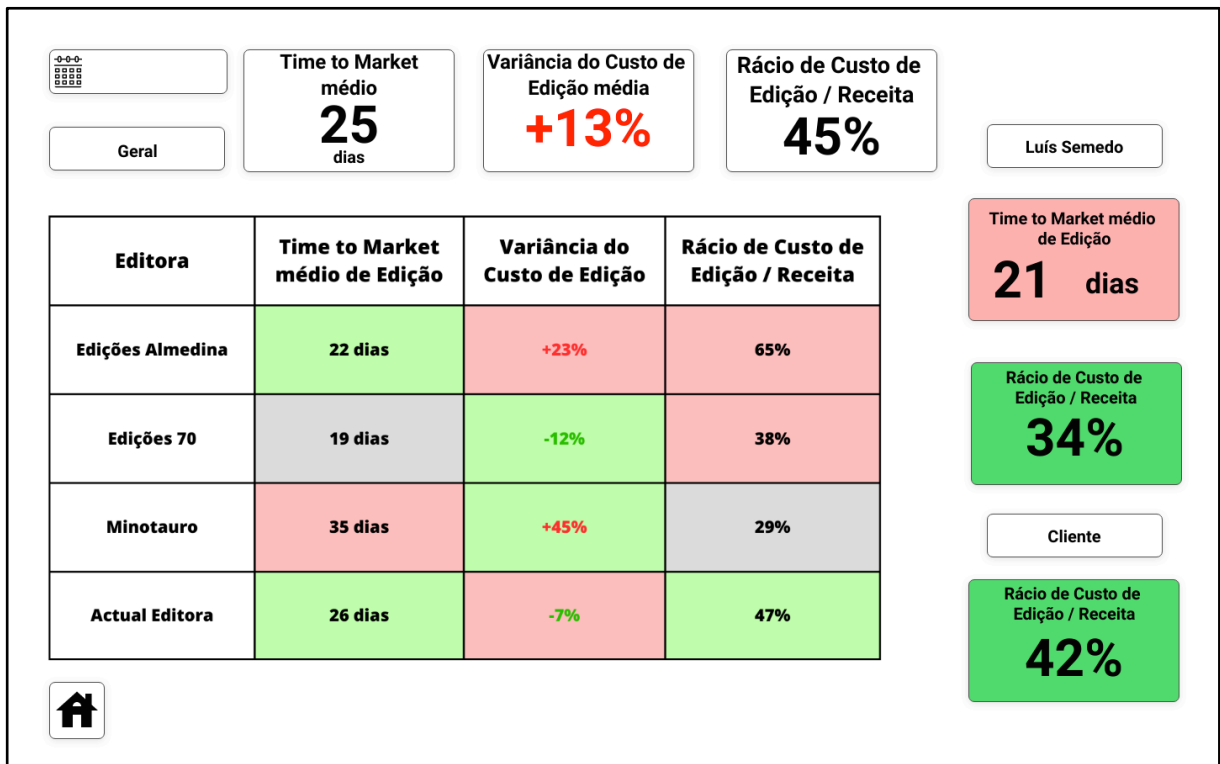
### Mockup page 19 - Performance Page per Editor Drill Down Selector



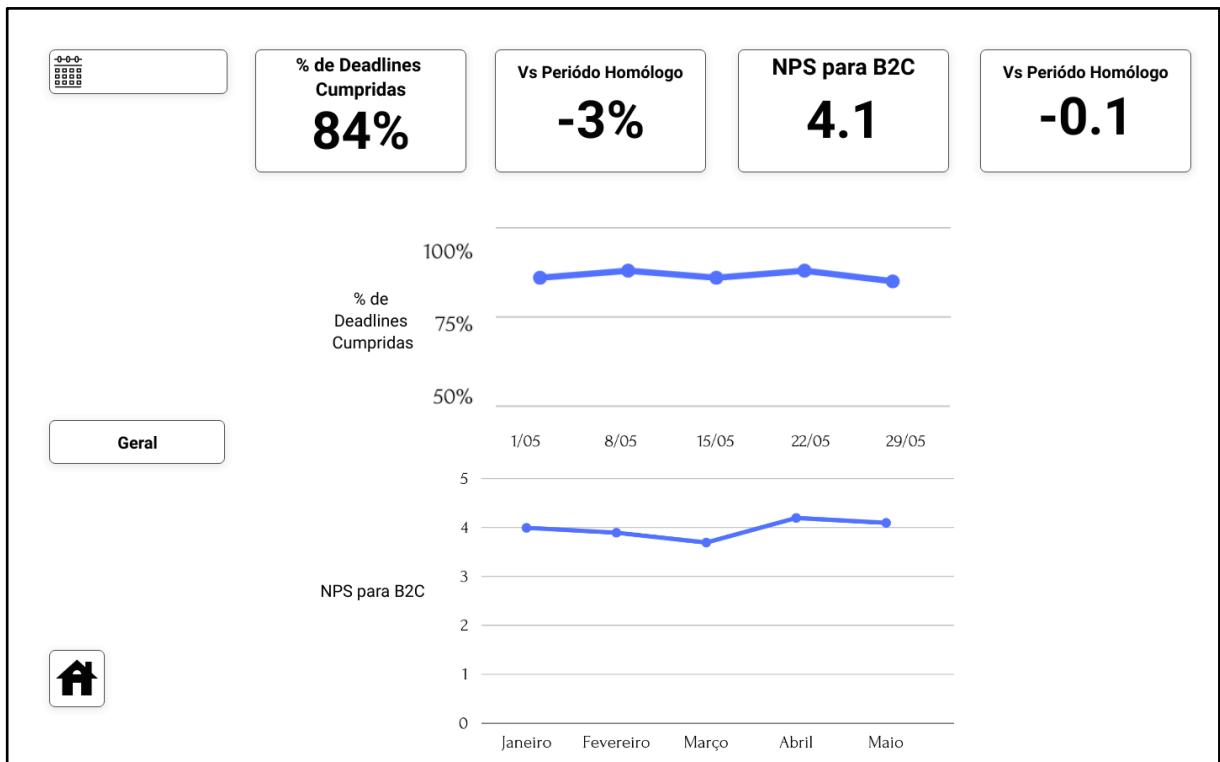
### Mockup page 20 - Performance Page per Editor and Client Drill Down



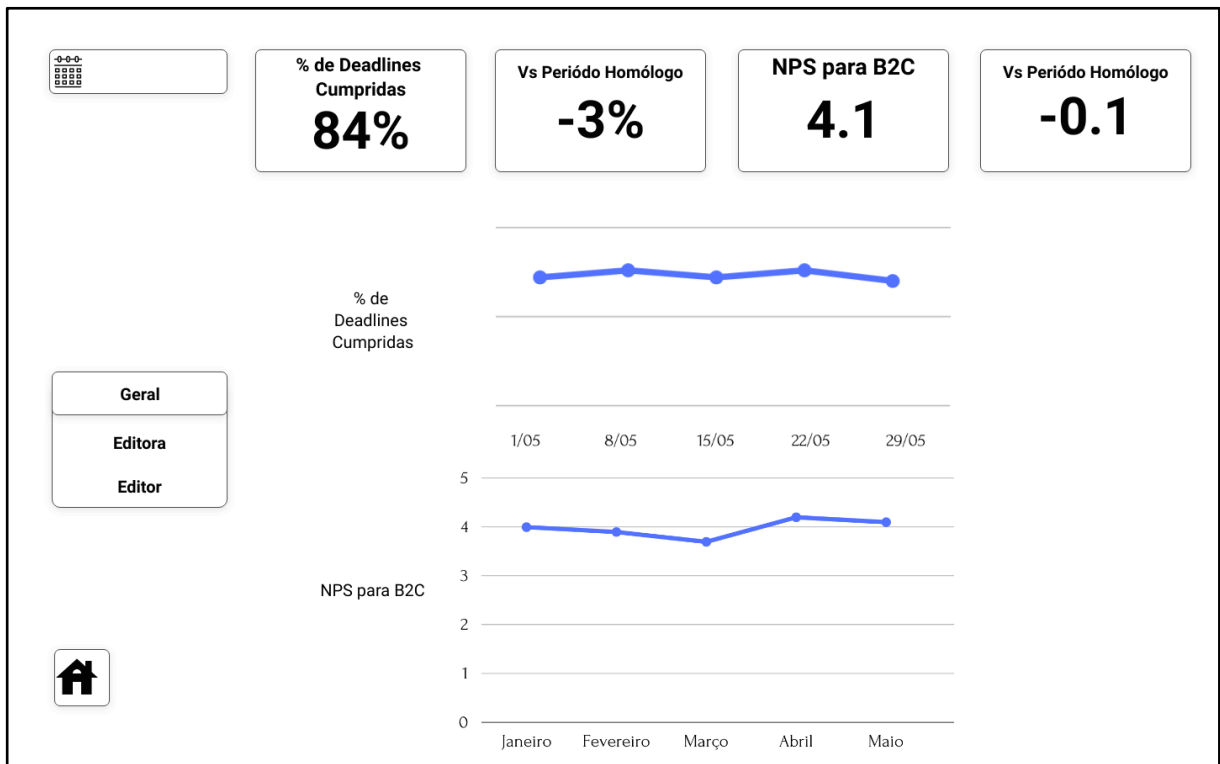
### Mockup page 21 - Performance Page per Editor Drill Down



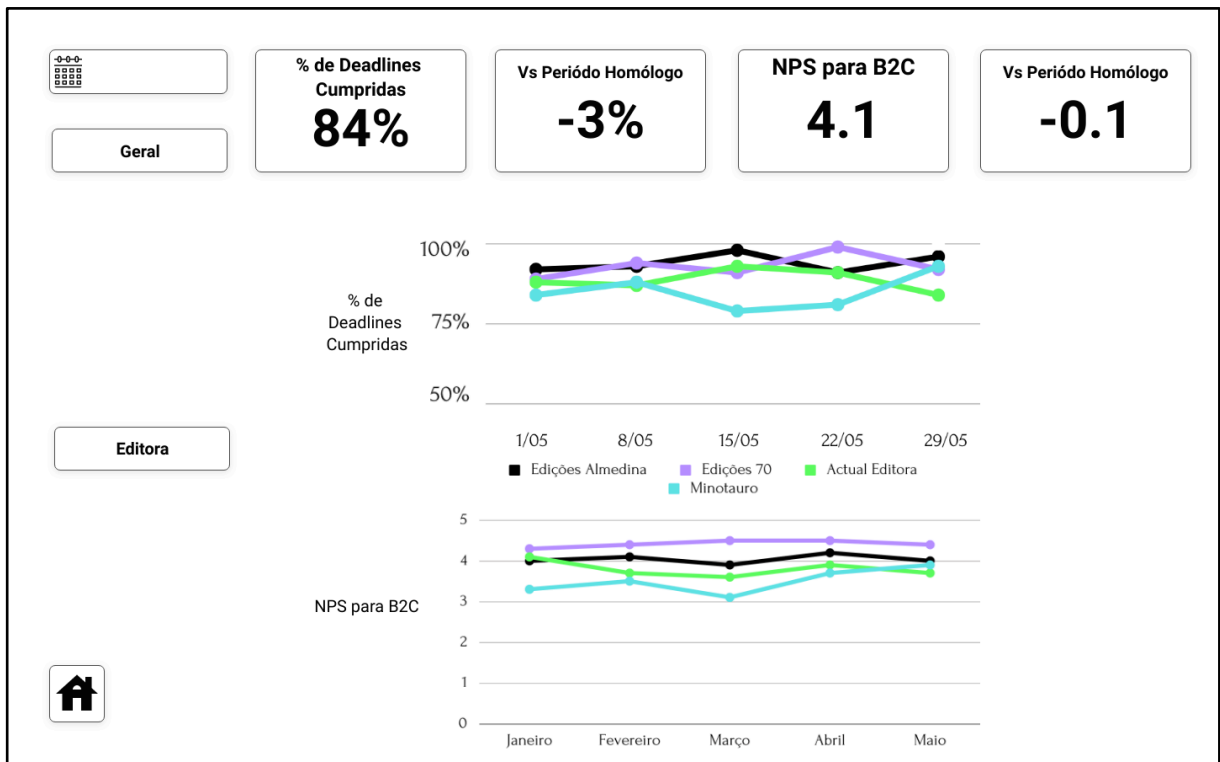
### Mockup page 22 - Client Main Page



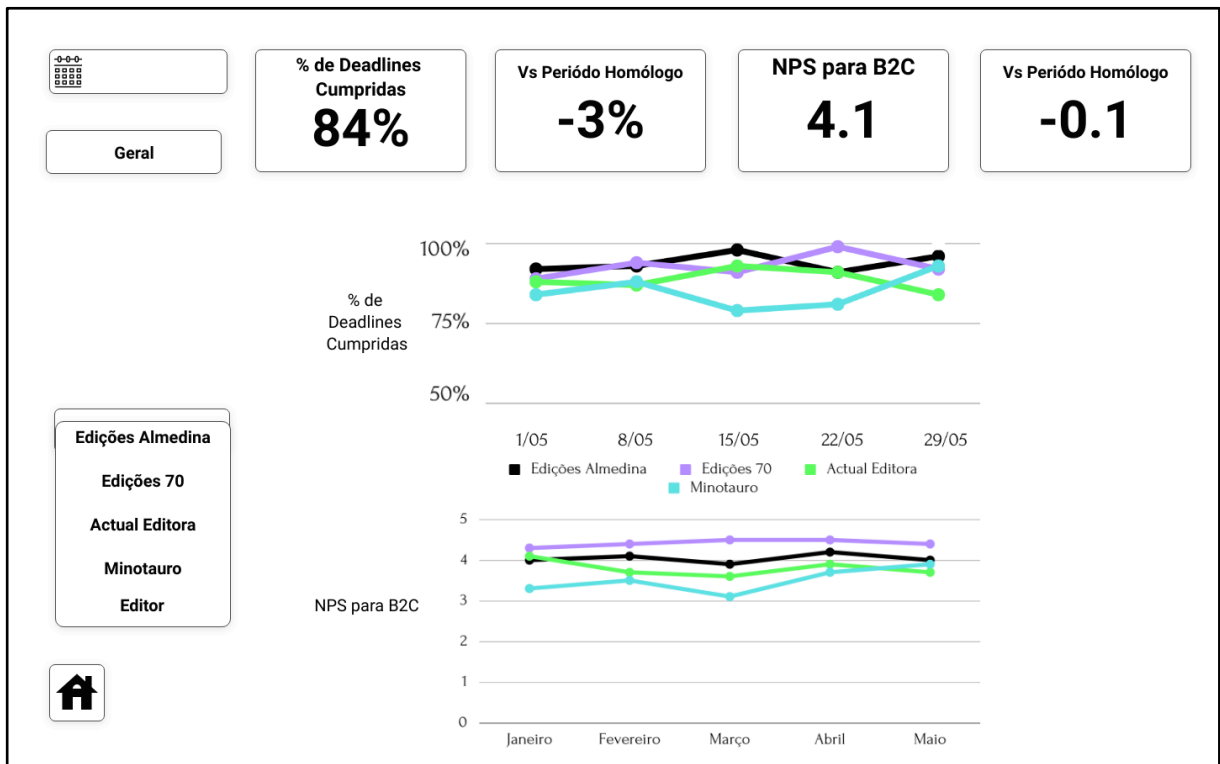
### Mockup page 23 - Client Page Drill Down Selector



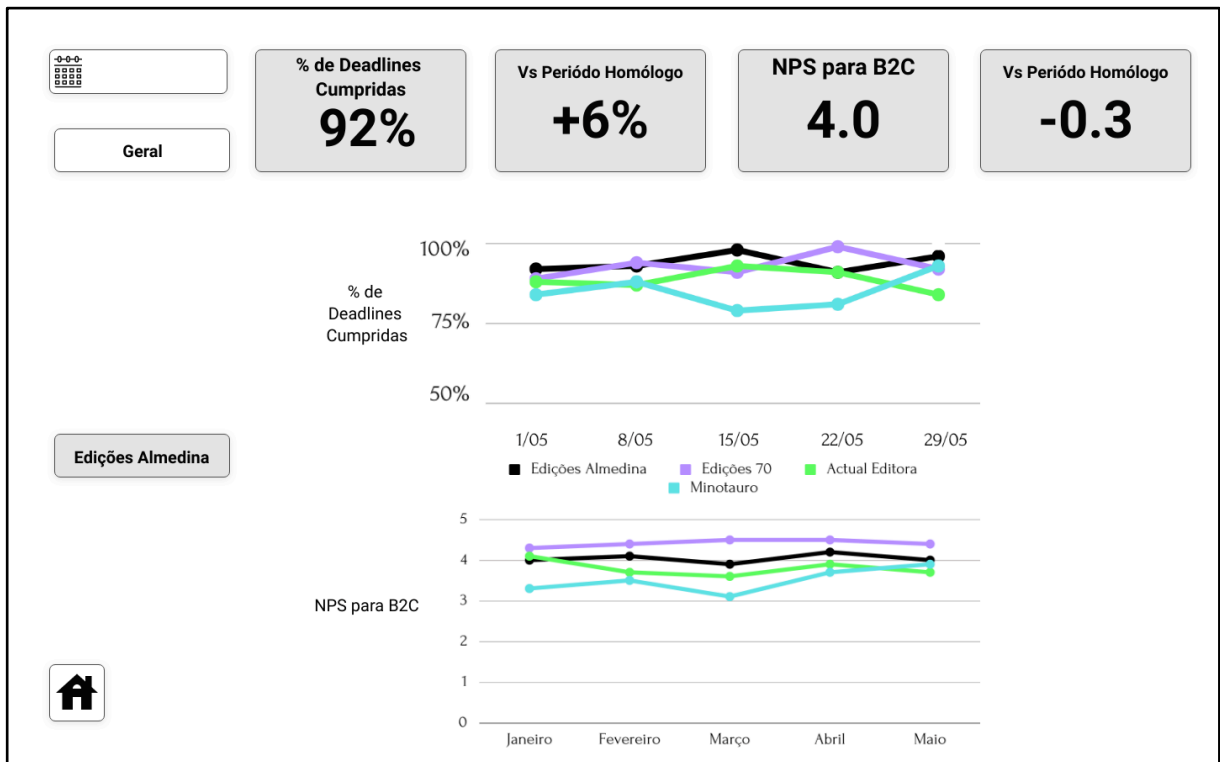
### Mockup page 24 - Client Page per Editorial Label Drill Down



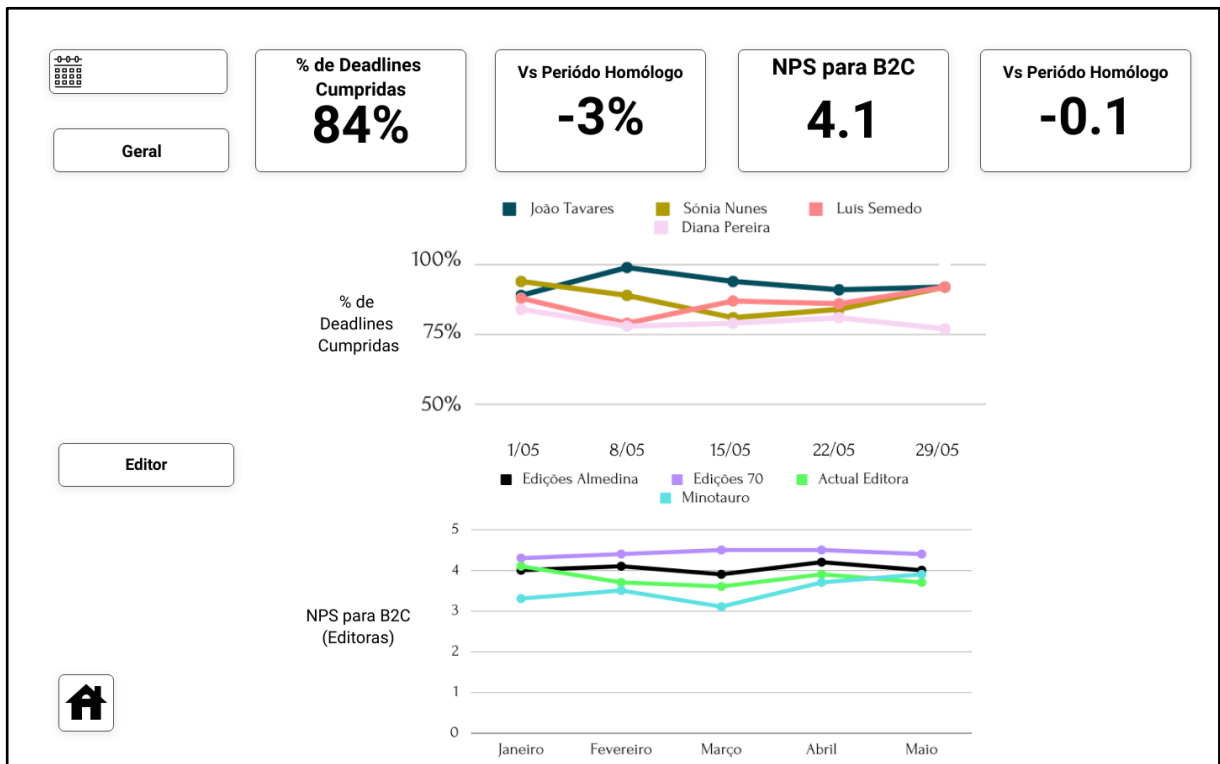
### Mockup page 25 - Client Page per Specific Editorial Label Drill Down Selector



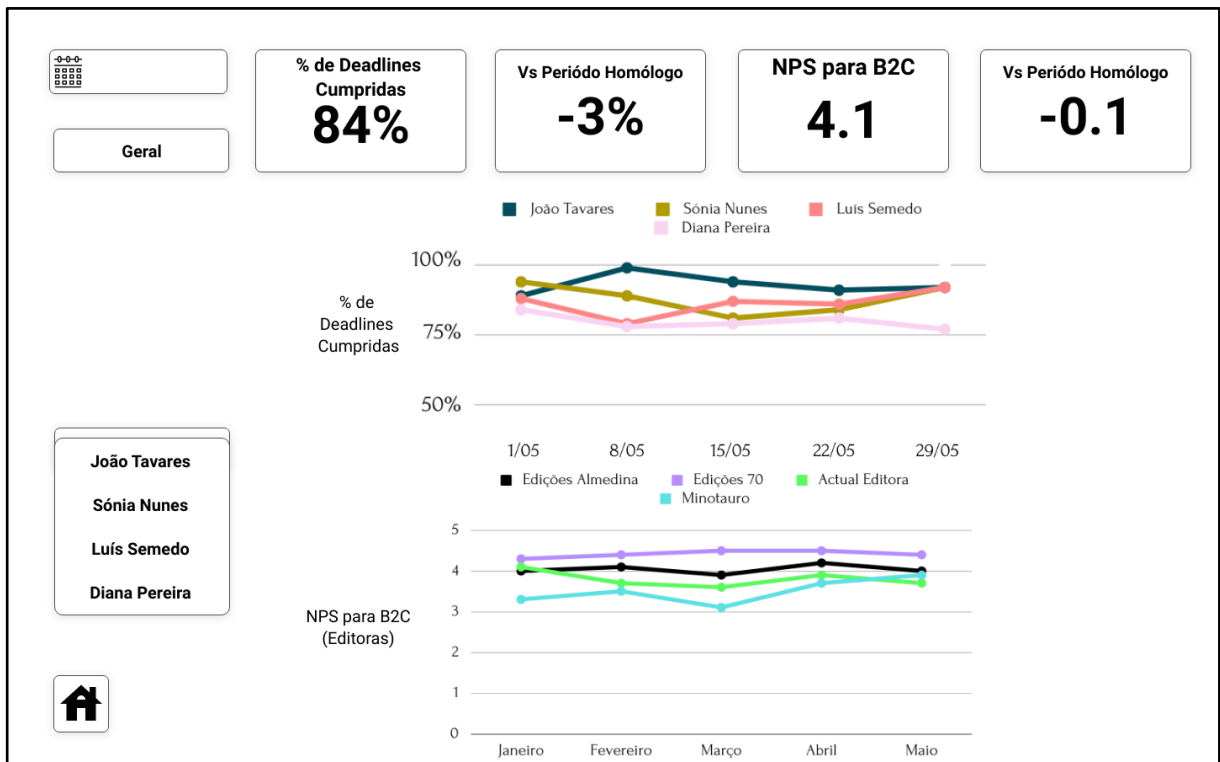
### Mockup page 26 - Client Page per Specific Editorial Label Drill Down



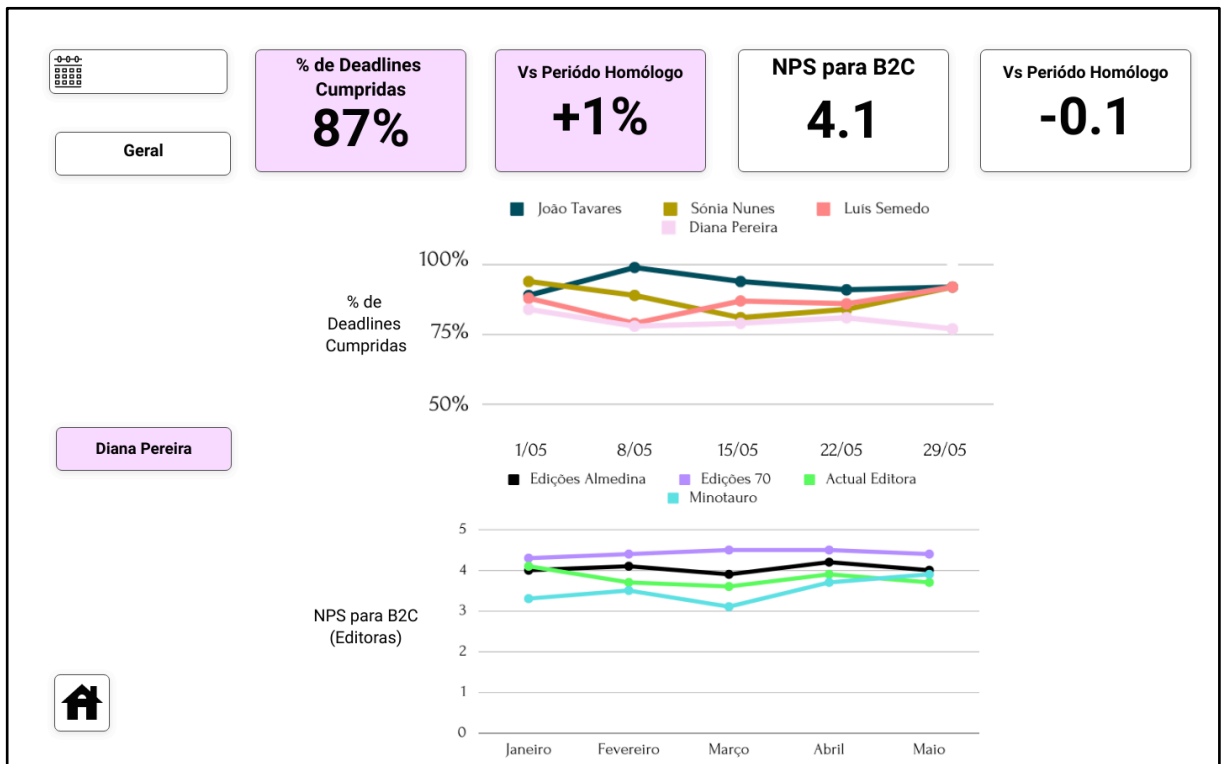
### Mockup page 27 - Client Page per Editor Drill Down



### Mockup page 28 - Client Page per Specific Editor Drill Down Selector



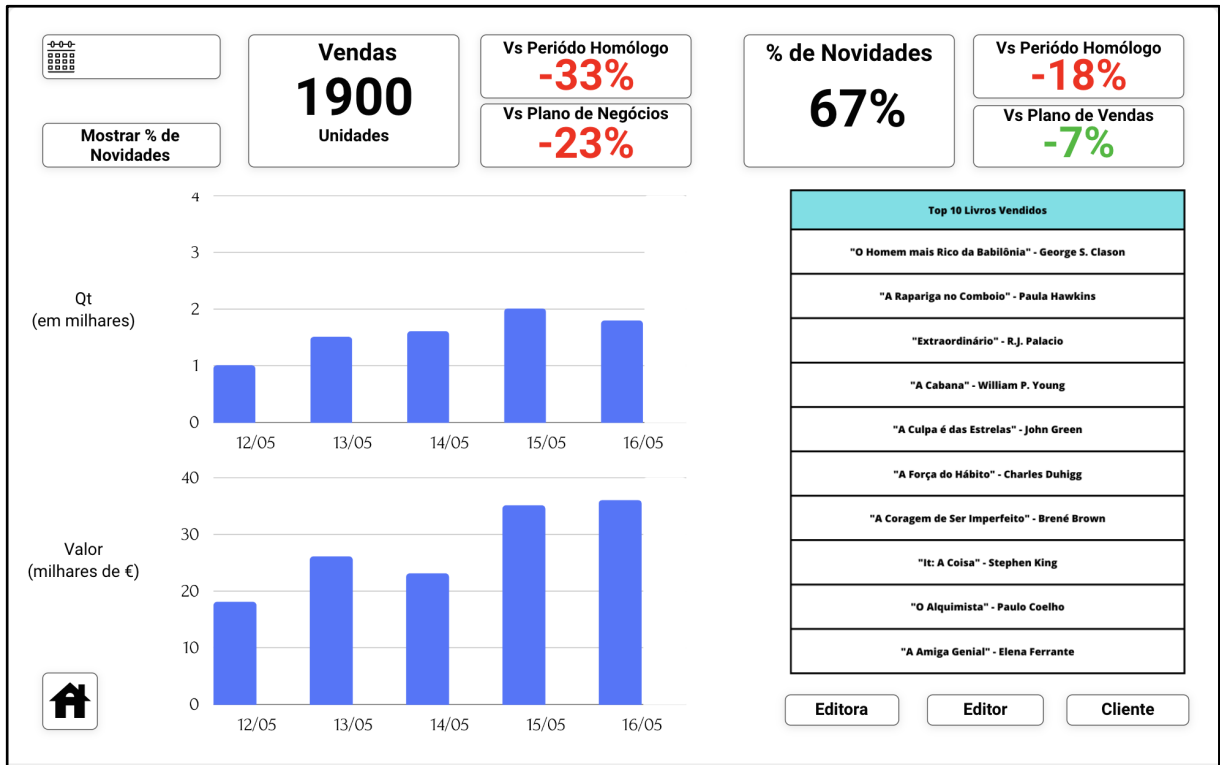
### Mockup page 29 - Client Page per Specific Editor Drill Down



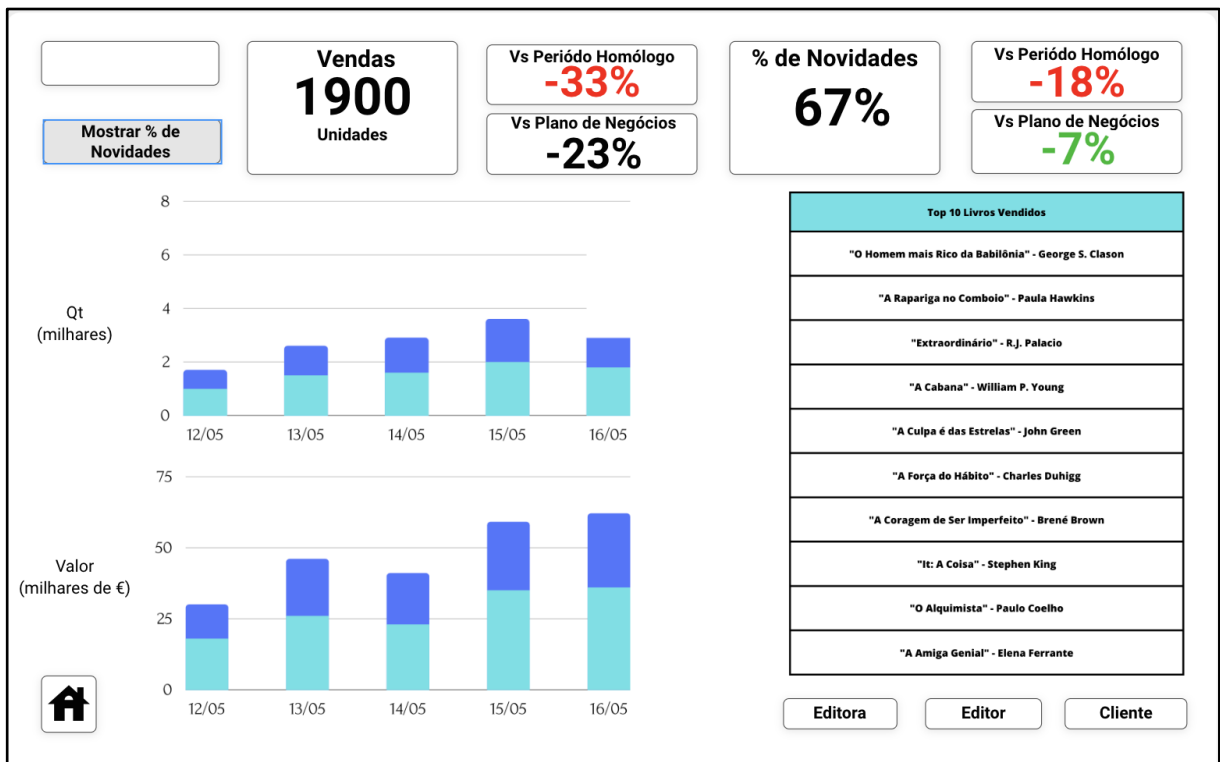
## APPENDIX G: Corrections to the dashboard post-usability testing.

The following mockups present the main changes to the ones in the previous appendix.

### Mockup page 30 - Sales Main Page

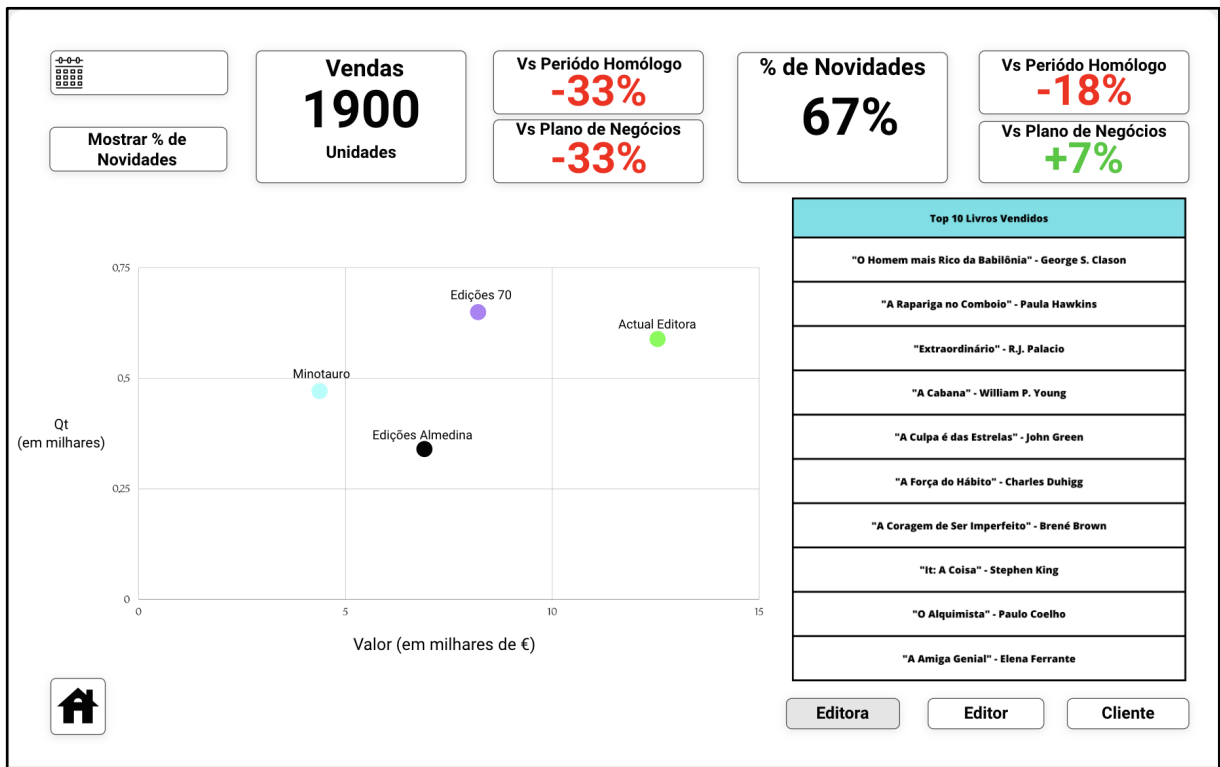


### Mockup page 31 - % of Sales Drill Down

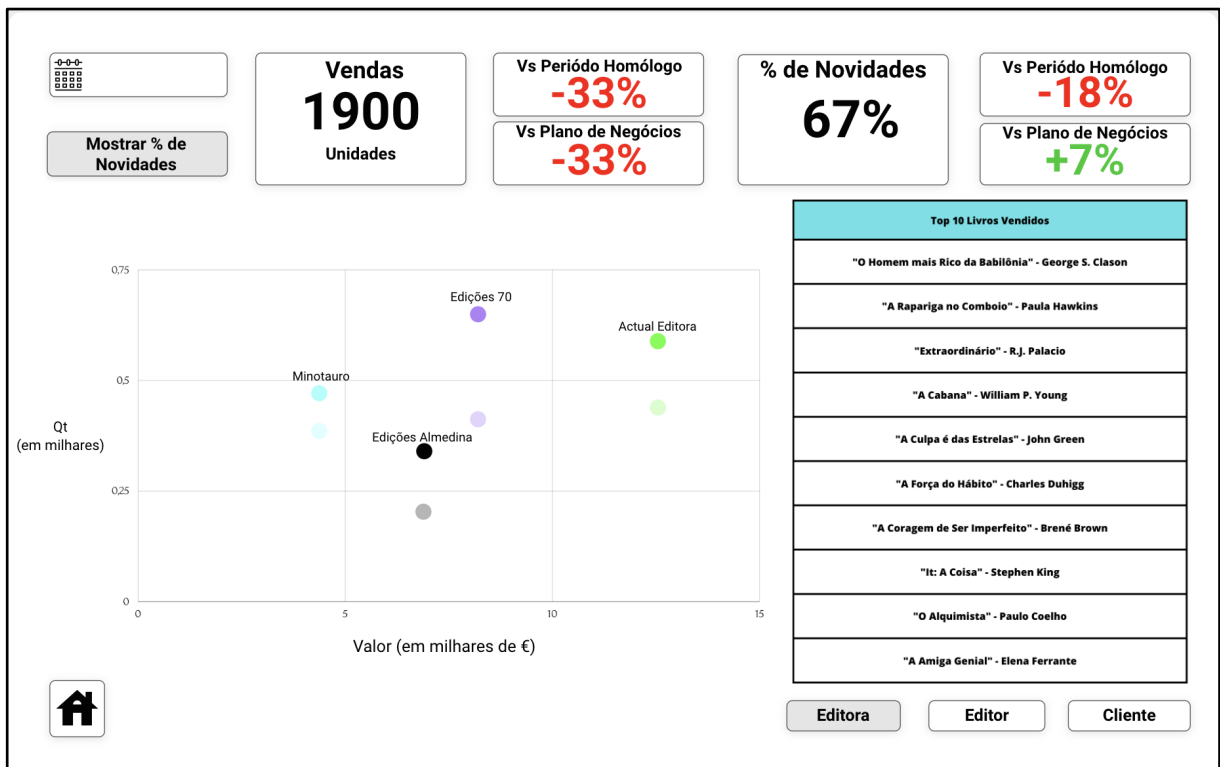




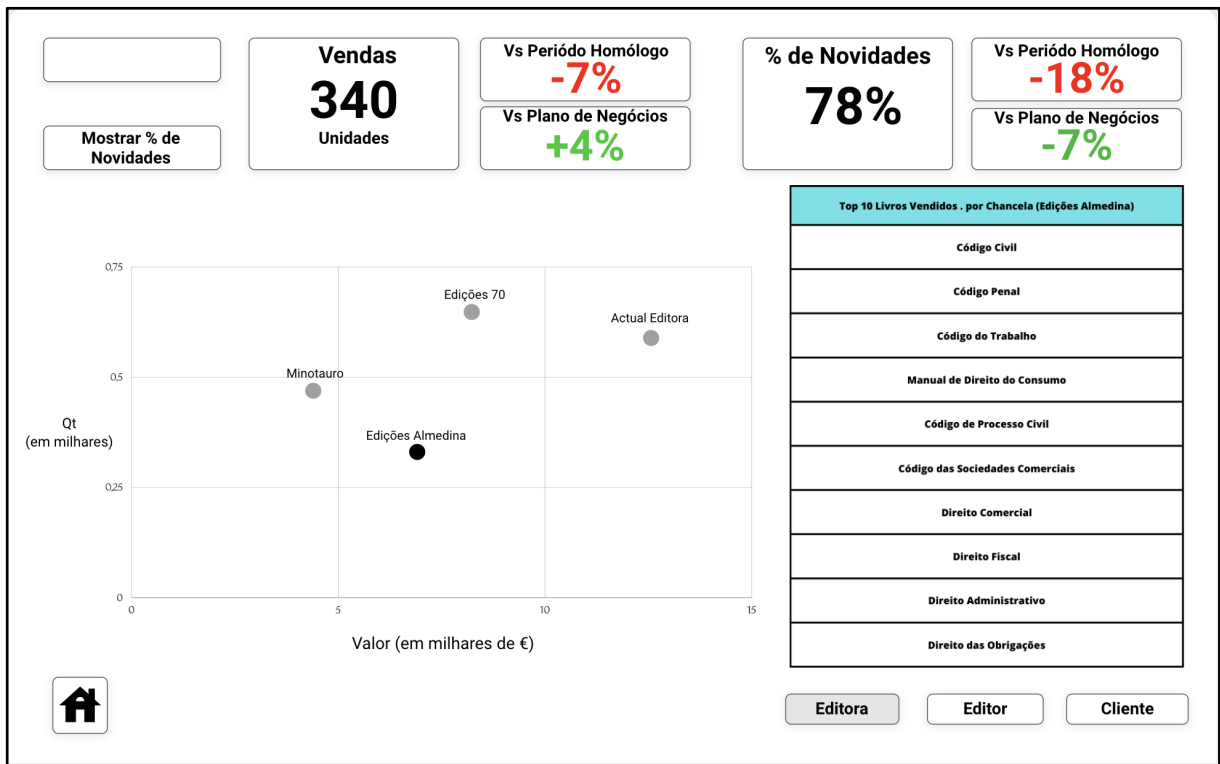
### Mockup page 32 - Sales per Editorial Label Drill Down



### Mockup page 33 - % of Sales Drill Down per Editorial Label Drill Down



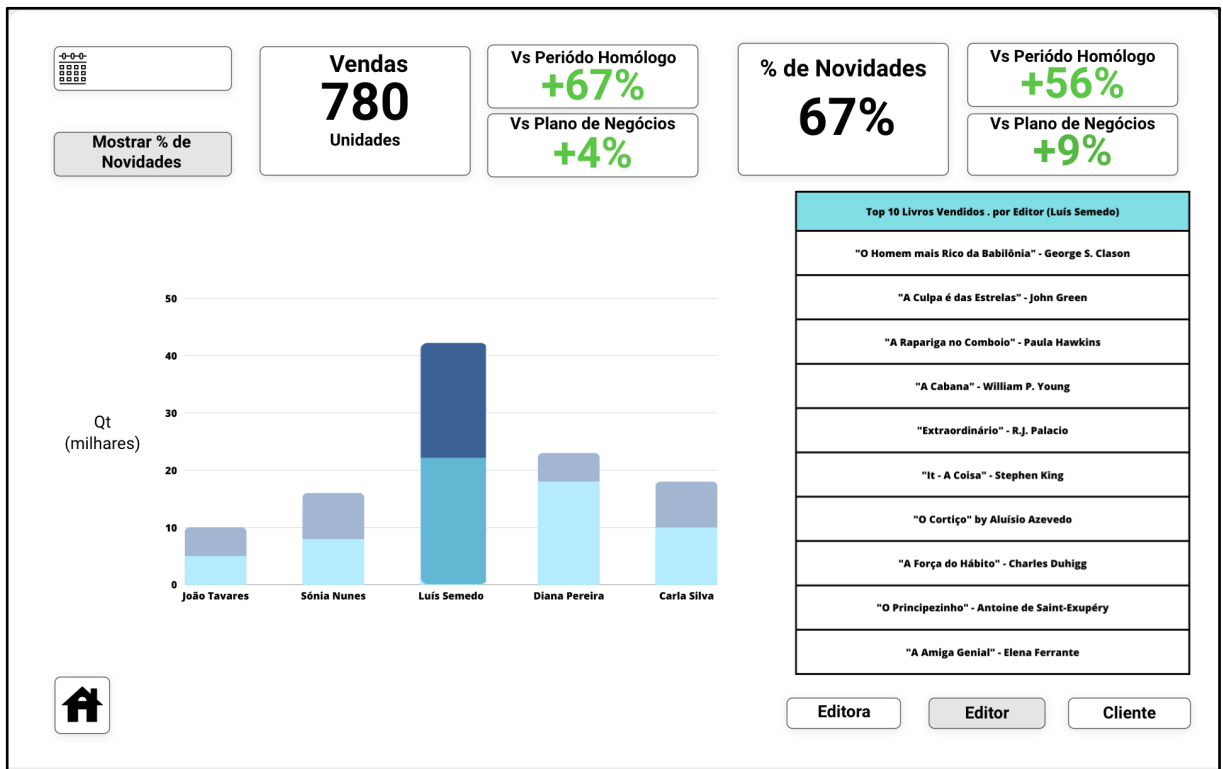
### Mockup page 34 - Sales per Specific Editorial Label Drill Down



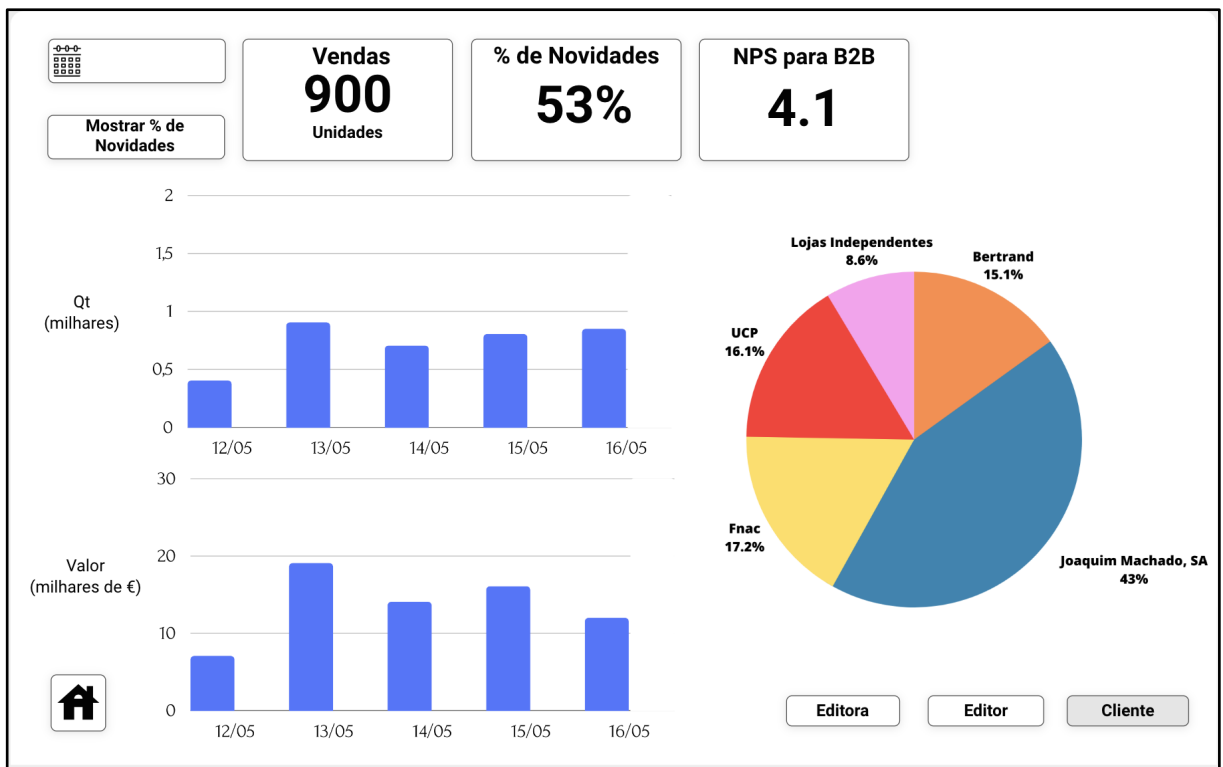
### Mockup page 35 - Sales per Editor Drill Down



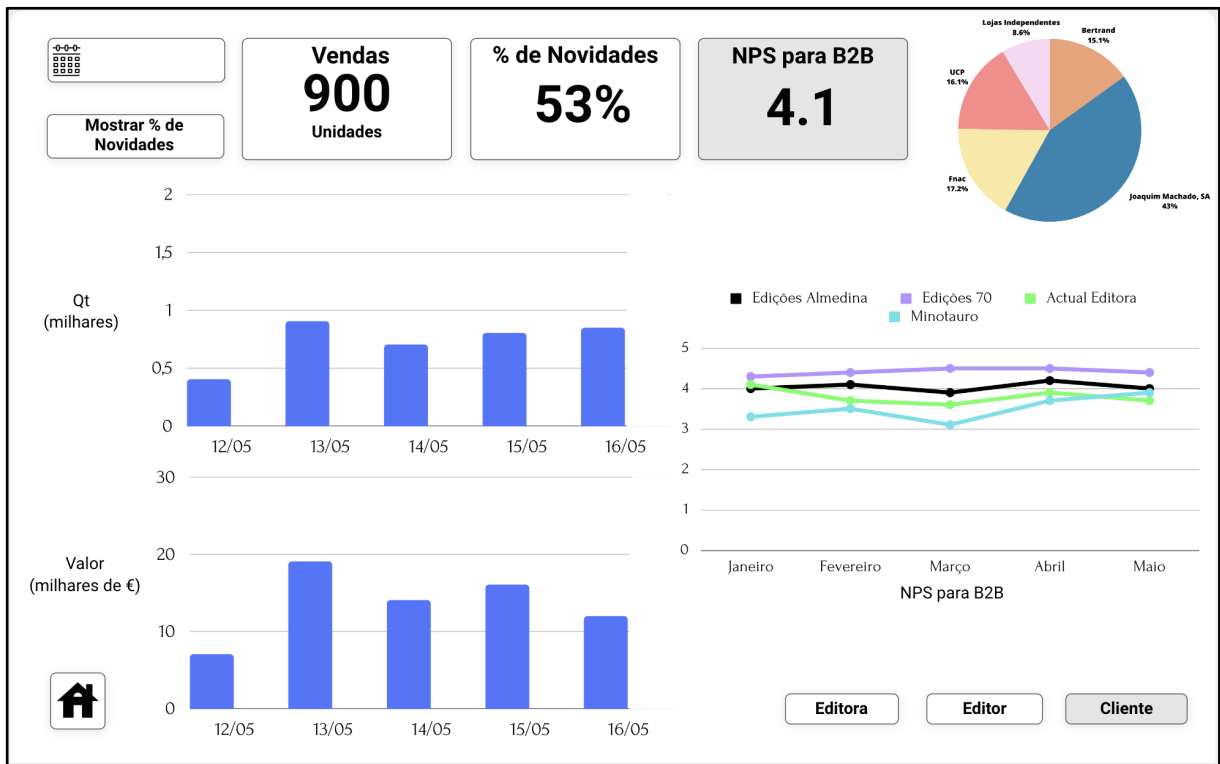
### Mockup page 36 - % of Sales Drill Down per Specific Editor Drill Down



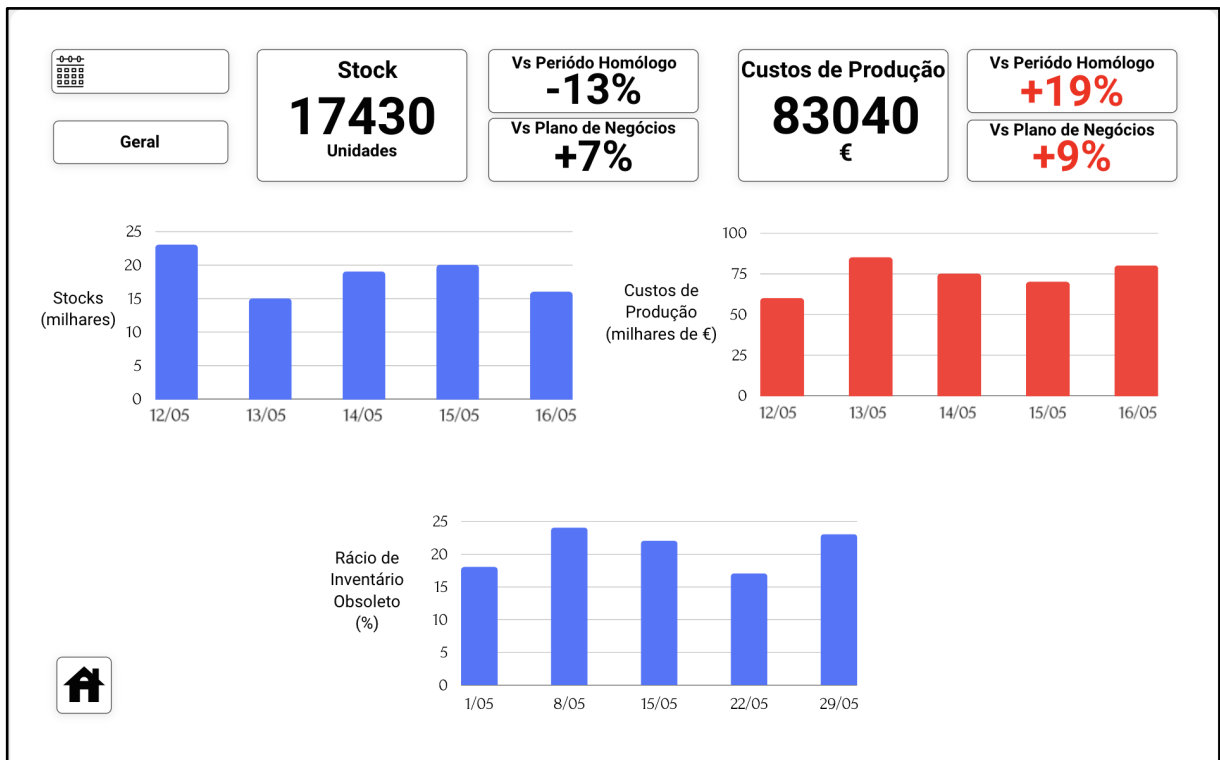
### Mockup page 37 - Sales per Specific Client Drill Down



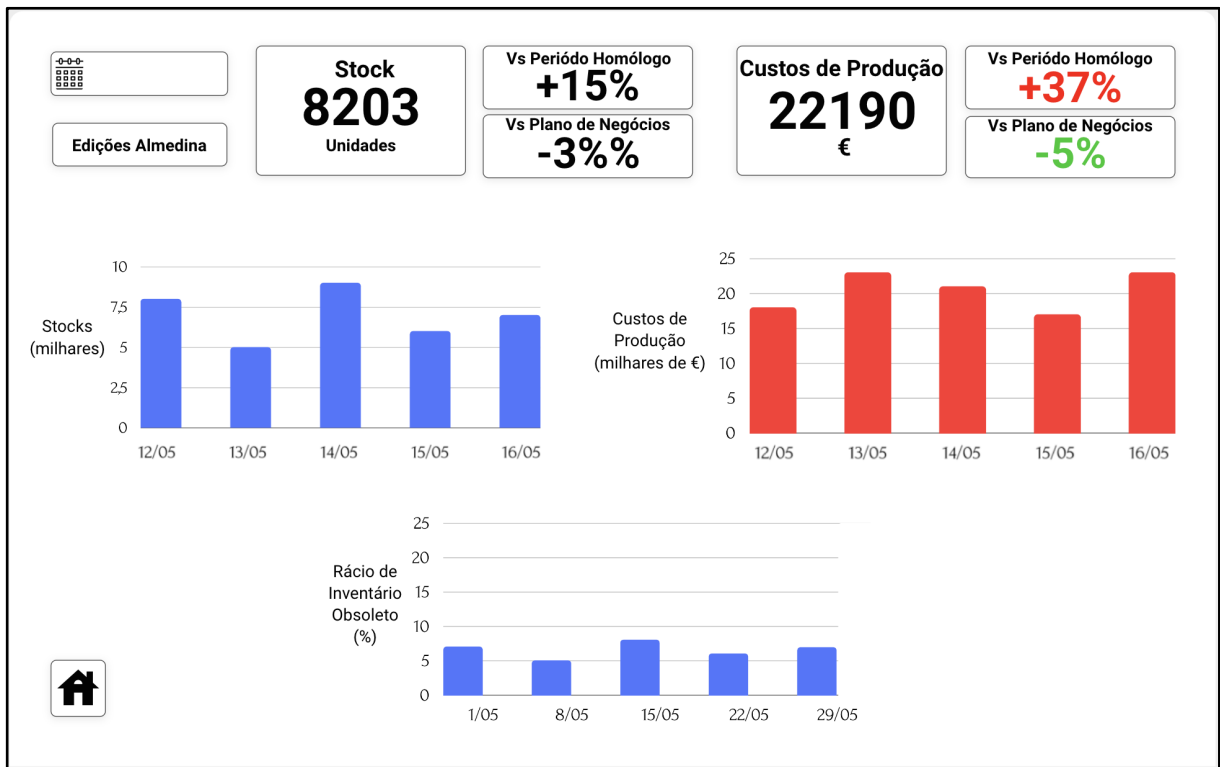
### Mockup page 38 - Sales per Client Drill Down with Detailed NPS open



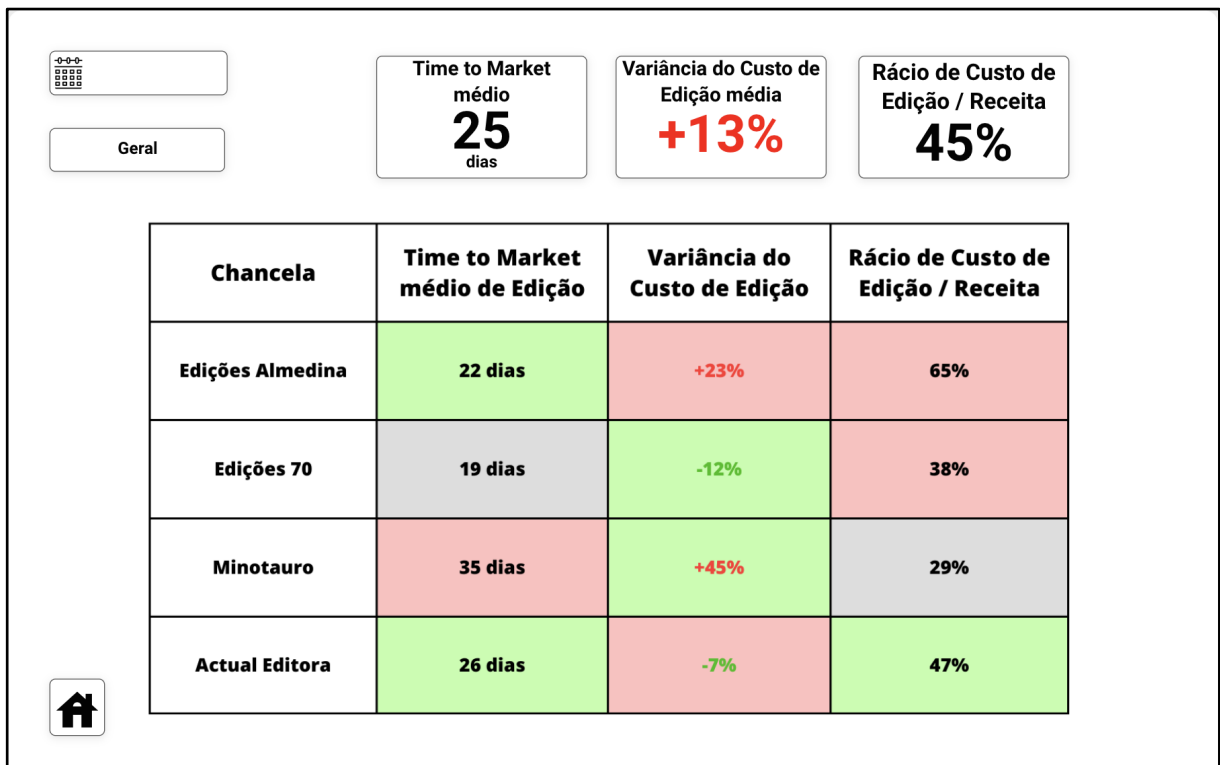
### Mockup page 39 - Operational Main Page



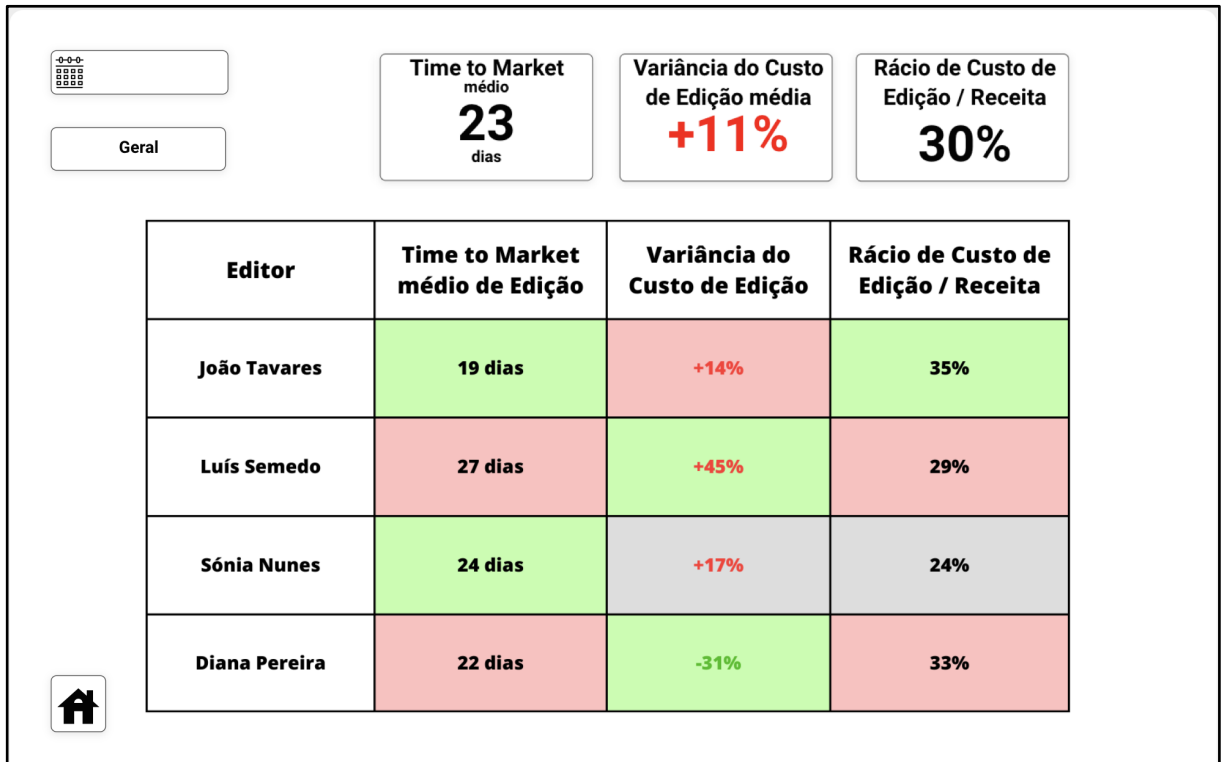
### Mockup page 40 - Operational Page per Specific Editorial Label Drill Down



### Mockup page 41 - Performance Main Page per Editorial Label



### Mockup page 42 - Performance Main Page per Editor



	Sales (quantity & value)	Stocks	Production Costs	% of New Arrivals Sold	Edit Cost / Revenue Ratio	Edit Time to Market	Ratio of Obsolete Inventory	Net Promoter Score for B2B	Edit Cost Variance
Sales (quantity & value)		X	X	X	X	X	X	X	
Stocks	X		X		X		X	X	
Production Costs	X	X		X	X			X	X
% of New Arrivals Sold	X		X			X		X	
Edit Cost / Revenue Ratio		X	X			X	X		
Edit Time to Market	X			X	X			X	
Ratio of Obsolete Inventory	X	X			X			X	
Net Promoter Score for B2B	X	X	X	X		X	X		
Edit Cost Variance			X						

**APPENDIX H: C**

## **APPENDIX I: Interview protocols for the selection of the team segment**

### **General steps**

Each interview had a number of questions to be asked, and points to touch, but the goal was always to allow the interviewee to speak freely and move to any topic that allowed them to provide the most information and opinions possible, and this goal was always mentioned at the start of the interview. Moreover, the interviewee was always for permission for a recording of the interview to be made. Only if this request was accepted the interview was conducted and further analyzed.

### **Interview 1 – Editorial team leader**

#### **[Introduction]**

- Can you describe your role and responsibilities as the leader of the editorial team at Grupo Almedina, and your team's composition?
- How do you manage and prioritize your workload and work direction on a daily basis?

#### **[Management]**

- How do you ensure that the editorial team's work, and its performance measurement aligns with the company's overall goals and objectives? What are the top level and bottom level goals for your team?
- Can you describe any areas where you think there is room for improvement in your team's performance, and what steps you are taking to address those issues?
- How do you measure the performance of your team?
- How does collaboration work with other teams (like Commercial) to ensure that the Editors have positive results?

#### **[Data and control]**

- How much time do you spend working on data to produce useful information and indicators?
- How do you perform individual numeric control of production and of the market?
- Do you take measures to ensure constant and consistent improvement of the team's processes? If so, what measures?
- What are your main clients?
- Do you place the customer at the center of your data analysis and performance measurement?

#### **[Indicators]**

- In your reply to the questionnaire, you rated your satisfaction with your current KPIs as 2/5. Why?



- What is your KPI selection process at the moment? (In the questionnaire their only source was what was in the company's SIGS).
- You selected, in order from most to least useful KPI: Daily Editor sales; Weekly production costs; Monthly Stocks. Why is that, and why this periodicity?
- Which KPIs do you employ and evaluate more often?

#### [Dashboards]

- How is the design of your dashboards set up? What do you value in its design?
- What are the main characteristics you wish to see in the selected KPIs and created dashboard?
- What is your opinion on the potential of the following dashboard capabilities? Real time, Drill down, scenario generation, external benchmarking, and tailored dashboards?

#### **Interview 2 – Commercial team leader**

#### [Introduction]

- Can you describe your role and responsibilities as the leader of the Commercial team at Grupo Almedina, and your team's composition?
- How do you manage and prioritize your workload and work direction on a daily basis?

#### [Management]

- How do you ensure that the Commercial team's work, and its performance measurement aligns with the company's overall goals and objectives? What are the top level and bottom level goals for your team?
- Can you describe any areas where you think there is room for improvement in your team's performance, and what steps you are taking to address those issues?
- How do you measure the performance of your team?
- How does collaboration work with other teams (like Editorial) to ensure have positive results?

#### [Data and control]

- How much time do you spend working on data to produce useful information and indicators?
- How do you perform individual numeric control of production and of the market?
- Do you take measures to ensure constant and consistent improvement of the team's processes? If so, what measures?

- What are your main clients?
- How is your relationship with the different clients? Does your approach change if you're in B2B or B2C dealings?
- Do you place the customer at the center of your data analysis and performance measurement?

### [Indicators]

- In your reply to the questionnaire, you rated your satisfaction with your current KPIs as 3/5. Why?
- What is your KPI selection process at the moment? (In the questionnaire their only source was what was in the company's SIGS).
- According to your form, you analyse quite a few KPIs, and you believe that you are still missing KPIs and, at the same time, that some of them are useless. Can you elaborate on this trouble you face?
- You selected, in order from most to least useful KPI: Retail sales; Editor Sales; Stocks. Why is that, and what is their periodicity?
- Which KPIs do you employ and evaluate more often?

### [Dashboards]

- How is the design of your dashboards set up? What do you value in its design?
- What are the main characteristics you wish to see in the selected KPIs and created dashboard?
- What is your opinion on the potential of the following dashboard capabilities? Real time, Drill down, scenario generation, external benchmarking, and tailored dashboards?