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QUALITY MANAGEMENT PROCESSES FOR SAP IMPLEMENTATION IN A LUXURY LEATHER GOODS INDUSTRY

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A B S T R A C T

This paper provides practical insights into the implementation of Systemanalyse Programmentwicklung within the luxury leather goods industry, focusing on anticipating challenges, supporting incremental organizational change, and minimizing disruptions to quality management processes. It addresses a gap in the literature by examining SAP implementation in contexts where artisanal craftsmanship and low-volume, high-value production are core operational characteristics. A case study was conducted at ATEPELI's atelier in Portugal, analysing the processes of Operational, Material, and Customer Quality. Data collection included process analysis, identification of performance gaps, and the development of improvement proposals such as new quality control stations, revised defect classification lists, standardized return procedures, and redesigned workspace layouts. The study identified gaps in defect detection, stock management, and compliance with return deadlines, while the proposed measures enhanced accuracy in identifying material and production issues and improved operational efficiency. The findings offer guidance for craftsmanship-based, low-volume production environments preparing for similar implementations.

1. INTRODUCTION

In the current competitive landscape, maintaining high standards of quality while simultaneously enhancing operational efficiency is imperative for organizations across sectors (Khajimuratov et al., 2024). This study addresses a notable gap in the literature concerning the adaptation and operationalization of quality management (QM) processes during SAP implementation within the luxury goods manufacturing sector. Although SAP's functionalities and quality modules are extensively documented in general terms, there remains a paucity of empirical research detailing the transitional and preparatory stages necessary to align pre-existing quality practices with SAP's system requirements, particularly in high-value, artisanal production environments (Bilancia et al., 2026; Ebirim et al., 2024; Madanhire & Mbohwa, 2016; Matende & Ogao, 2013). This paper seeks to contribute to this underexplored area through an in-depth case study of a luxury leather goods manufacturer, with the additional aim of identifying common success factors and outlining transferable strategies that may lead to similar digital transformation initiatives.

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The deployment of advanced ERP systems, most notably SAP, has emerged as a transformative approach to achieving these dual objectives (Chand et al., 2005; Llivisaca-Villazhañay et al., 2025; Madanhire & Mbohwa, 2016; Sri et al., 2024; Syamsuddin et al., 2023). ERP systems are designed to integrate a wide range of business functions, thereby enabling seamless communication and collaboration across organizational units. Among these systems, SAP stands out as a leading ERP solution, playing a pivotal role in process optimization across diverse industrial sectors (SAP SE, 2022). Its modular architecture facilitates the development of customized configurations tailored to specific organizational needs, thereby enhancing operational efficiency and supporting data-driven decision-making. By enabling the integration of heterogeneous business functions, SAP fosters intra-organizational collaboration and communication, ultimately contributing to streamlined workflows and a sustained competitive advantage in the global marketplace (Chiarini, 2020; Target Integration, 2023).

A core component of SAP is the Quality Management (SAP-QM) module, which is instrumental in supporting quality control (QC) processes. It aids in defect prevention, promotes continuous improvement, and ensures adherence to international quality standards. These capabilities contribute to regulatory compliance, cost reduction, and enhanced customer satisfaction. Moreover, SAP-QM is essential for audit readiness, corporate standardization, and quality assurance, thereby facilitating certification in accordance with global quality benchmarks (Abdusalomova et al., 2024; ÇaÇaron, 2022; SAP, 2023). The strategic deployment of professionally managed SAP-QM modules is increasingly recognized as a critical factor in enhancing organizational competitiveness, particularly in sectors where quality management is of paramount importance. Empirical studies have demonstrated that the integration of SAP-QM with other modules, such as Materials Management (MM), Production Planning (PP), and Sales and Distribution (SD), significantly improves process efficiency and reduces operational expenditures (Ebirim et al., 2024; Kagermann et al., 2013; Llivisaca-Villazhañay et al., 2025; Madanhire & Mbohwa, 2016; Majeed & Rupasinghe, 2017; Martins et al., 2021; Syamsuddin et al., 2023).This integration supports continuous process improvement, minimizes manufacturing errors, and facilitates the implementation of sustainable quality control practices (Balon et al., 2024; Gonçalves et al., 2024; Gvozdenovic et al., 2008; Martinez, 2019; Vukcevic, 2008).

The focal point of this case study is ATEPELI, a prominent manufacturer of components for luxury leather goods. Established in 2011 and operating under one of the world's leading luxury conglomerates, ATEPELI exemplifies a hybrid production model that integrates artisanal craftsmanship with advanced quality assurance and manufacturing systems. The company employs over 1,184 individuals across three ateliers located in northern Portugal (Ponte de Lima, Penafiel, and Santa Maria da Feira) and specializes in the production of high-end components such as bag handles, straps, and wallet interiors for globally recognized luxury brands. Its principal facility in Ponte de Lima functions as the central hub for innovation and process optimization. In contrast to mass production settings characterized by high levels of automation, ATEPELI's operations necessitate flexible and adaptive QM approaches to ensure both product uniqueness and consistency. In 2024, the company initiated the implementation of the SAP system at its Ponte de Lima site as part of a broader digital transformation strategy. This study specifically investigates this implementation, focusing on how SAP was introduced within a context that emphasizes craftsmanship and operational excellence.

As ATEPELI integrates SAP into its operational infrastructure, it becomes essential to evaluate the alignment between existing QM procedures and the structural and functional demands of the ERP system. This research aims to identify procedural gaps, implementation challenges, and opportunities for improvement within the quality department through a comprehensive analysis. Furthermore, the study is motivated by the objective of facilitating a seamless transition by proposing and executing incremental modifications to the QM framework. These modifications are designed to be compatible with SAP's capabilities and informed by prior implementation experiences, thereby supporting a smooth and sustainable shift toward digitally enabled operations (Bilancia et al., 2026).

The structure of this paper is organized into five sections. Section 2 introduces the case study. Section 3 analyses the existing processes within ATEPELI's quality department. Section 4 describes the improvement initiatives undertaken to implement SAP. Section 5 discusses the key findings and concludes with a summary of the study's main contributions.

2. CASE STUDY

This section presents the case study underpinning this research. It begins by providing an overview of the project that initiated the implementation of SAP at ATEPELI. Subsequent subsections detail the context of the study, specifically, the ATEPELI atelier located in Ponte de Lima and offer a description of the department responsible for overseeing the implementation, namely, the Quality Department.

2.1 ATEPELI Project: "One Manuf"

Recognising the contemporary consumer demand for both high-quality products and rapid delivery, ATEPELI's parent group launched a global initiative encompassing all its ateliers. Initially titled Manufacturing 2020 and now referred to as One Manuf, this strategic project seeks to transform manufacturing processes to more effectively respond to evolving customer expectations. The One Manuf initiative is structured around three principal objectives. The first is speed, which aims to significantly reduce lead times by accelerating production cycles. A key target is to decrease dispatch times to Cergy (the group's central logistics hub) from 23 days to just 5. The second objective is simplicity, focused on operational streamlining through process simplification, thereby enabling faster and more efficient production without compromising product quality. The third is efficiency, which promotes cross-functional collaboration throughout the production chain to enhance overall performance and ensure optimal functioning at every stage.

Central to this initiative is the implementation of the Core Model, an innovative organisational framework designed to standardise manufacturing procedures across all ATEPELI ateliers. The Core Model enhances safety and consistency in production and facilitates a seamless workflow from receipt to dispatch. This is achieved through micro-planning checks that verify the availability of all necessary components prior to initiating manufacturing orders.

The integration of the SAP system plays a pivotal role in supporting the Core Model. It enables precise inventory management and fosters collaboration between ateliers and suppliers, thereby allowing for agile responses to unexpected demand fluctuations. SAP also facilitates standardised labelling and digital delivery notes, which streamline warehouse operations and ensure efficient placement into optimised storage systems. Furthermore, the leather cutting process is informed by consumption data from the preceding 24 hours, enabling the preparation of new assembly kits within a two-hour window and minimising production delays.

The implementation of SAP across all ateliers is a complex and time-intensive endeavour. It involves a dedicated project team from the group's headquarters working in close collaboration with a local team at each atelier. The local team typically comprises one or two representatives from each department. Together, these teams engage in a multi-month process to customise and adapt the system to the specific operational requirements of each atelier.

2.2 ATEPELI Ponte de Lima

ATEPELI is a subsidiary of one of the largest multinational groups in the leather goods sector, operating in over 80 countries worldwide. In Portugal, the company maintains three manufacturing units located in Ponte de Lima, Penafiel, and Santa Maria da Feira. The Ponte de Lima atelier has served as the company's principal operational centre since its inception, specialising in the production of high-quality leather goods components. Across its three Portuguese ateliers, ATEPELI employs a total of 1,184 individuals, each contributing to the pursuit of excellence in product quality through specialised techniques in component assembly, manual cutting, and sewing, all tailored to meet specific customer requirements. The Ponte de Lima atelier focuses primarily on the production of components for luxury handbags, such as handles and straps, rather than on the assembly of finished products (Figure 1). These components are categorised into two main families: Small Leather Goods (SLG), which are used in the interior of items such as wallets and coin purses, and Leather Goods (LG), which are applied to the exterior of luxury handbags. LG production is further divided into flat components (CPs) and toron. CPs include items such as Bandoulière (long straps), Tirette (zipper puller), Coche, Sanglon, Poignée Plate, Lien, and Porte Address (address tag), which constitute the majority of daily output. Toron production is dedicated to crafting bag handles (poignées) reinforced with an internal rope for added firmness, from which the name "toron" (French for rope) is derived. SLG components, including Soufflet, Poche-Monnaie, and Poche CC, are primarily used in wallet construction. Figure 1 provides visual examples of these components and their respective applications.

Figure 1. Examples of components produced at ATEPELI Ponte de Lima

The ATEPELI Ponte de Lima atelier encompasses a comprehensive range of operations, including material cutting, preparation, assembly, quality control, packaging, order dispatch to clients, and material storage. These activities are distributed across two distinct facilities: the Calvelo atelier and the Logistics and Cutting (LC) building, located approximately six kilometres apart. The LC building houses the cutting section (responsible for supplying leather, reinforcements, and synthetic materials) as well as the warehouse. All other production processes are conducted at the Calvelo atelier.

2.3 Calvelo facility shop floor

Figure 2 illustrates the shop floor layout of the Calvelo facility, which comprises eleven production lines organised according to product family and process type. These lines are divided into preparation areas (designated with the prefix "P") and assembly areas (designated with "M").

Leather Goods (LG) components undergo initial processing in one of two preparation lines (PLG 1 or PLG 2), after which they are directed to the appropriate

assembly lines: MCPs for flat components (CPs), and either M Speedy or M Alma for Toron components, as depicted in Figure 3. Workloads are dynamically redistributed across these lines as necessary. Components are transferred from preparation to assembly in small batches, typically consisting of 30 units per box.
The production of Small Leather Goods (SLG) follows a similar workflow, beginning with the PSLG preparation line and continuing through the MSLG assembly line. Additionally, a dedicated Capucines line (CAP) operates independently, managing both the preparation and assembly stages exclusively for that product.
Following final approval and inspection, the components are transferred back to the Logistics and Cutting (LC) building. Within this facility, the logistics department undertakes the meticulous tasks of packaging, labelling, and processing the components in preparation for subsequent product shipments.

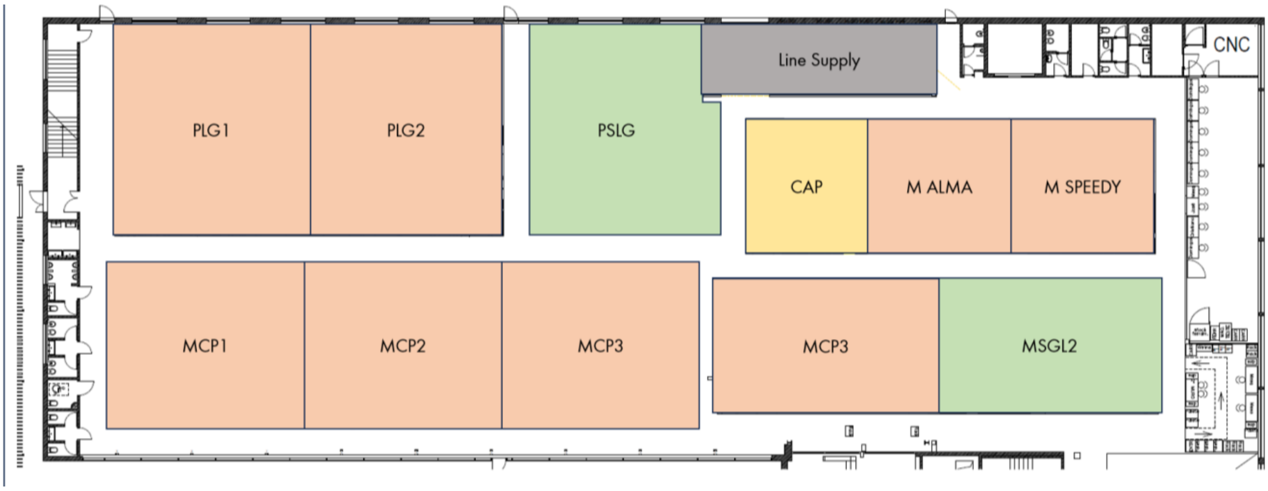

Figure 2. Shop floor layout of the ATEPELI Ponte de Lima – Calvelo atelier

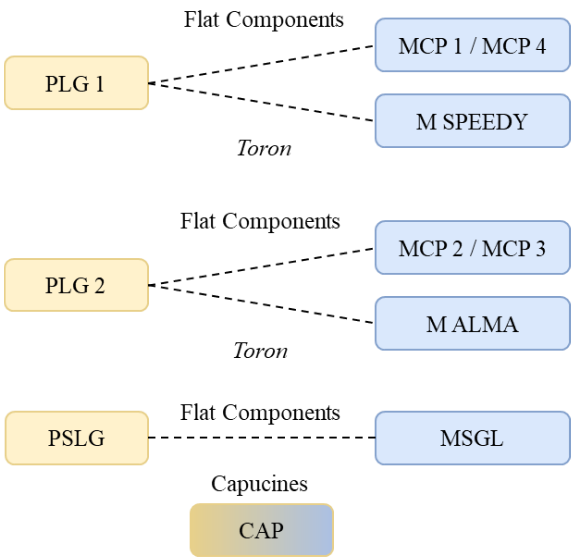

Figure 3. Shop floor layout of the ATEPELI Ponte de Lima – Calvelo atelier

2.4 ATEPELI Ponte de Lima Quality Department

The ATEPELI Ponte de Lima atelier is structured into ten distinct departments, each corresponding to a specific functional domain within the organisation: Methods and Continuous Improvement, Industrialisation, Development, Quality, Logistics, Production, Finance, Human Resources, Information Technology, and Technical Services. All departments report directly to a single member of the Board of Directors, ensuring streamlined governance and strategic alignment. Within this structure, the Quality Department plays a pivotal role in maintaining the high standards required by the luxury goods sector. Comprising a team of 12 professionals, the department oversees critical quality functions, including material inspection, in-process control, customer feedback management, and validation of new products. Each function is supported by systematic quality checks and targeted strategies designed to proactively identify and resolve issues prior to component shipment.
As ATEPELI progresses in its digital transformation, the Quality Department has been instrumental in integrating traditional quality assurance practices with the capabilities of the SAP system. This integration ensures that digital tools complement, rather than replace, expert judgment, thereby reinforcing a culture of continuous improvement while preserving the artisanal values central to the company's identity.

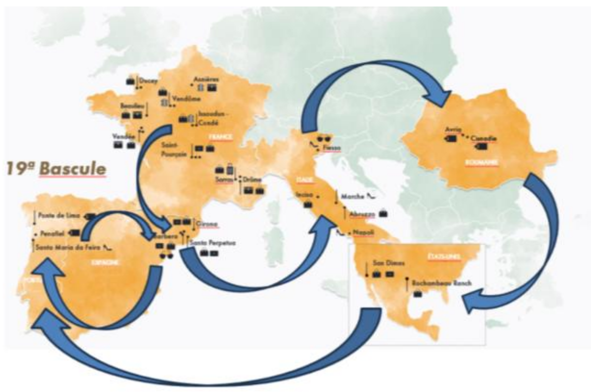

Figure 4. Illustration of "One Manuf" SAP implementation across all ateliers

The group operates three component ateliers dedicated to the production of bag handles, straps, and other small parts: ATEPELI Penafiel, which was the first to implement SAP; an atelier in Romania, which followed; and ATEPELI Ponte de Lima, the site of the present study. This atelier has benefited from the insights and lessons learned during SAP integration at its sister facilities.
The SAP implementation at ATEPELI Ponte de Lima marked the 19th deployment within the group (Figure 4). Originally scheduled for 2020, the project was postponed to 2024 due to the COVID-19 pandemic. This delay ultimately proved advantageous, allowing the project team to incorporate feedback and best practices from previous implementations, thereby facilitating a smoother transition.

3. CURRENT SITUATION ANALYSIS

The initial phase of this study involved obtaining a comprehensive understanding of ATEPELI's existing QM procedures. This phase focused on analysing current workflows and systems across the company's production sites, with the objective of identifying potential bottlenecks and opportunities for improvement, particularly those that could be addressed through the integration of the SAP system.
This section provides a concise overview of the quality process flows currently in place within the Quality Department at ATEPELI Ponte de Lima, accompanied by a critical analysis of these procedures. More detailed information regarding each process is available in Gonçalves et al. (2025). The Quality Department is structured into three core functional areas: Material Quality, Operational Quality, and Customer Quality. Each area plays a vital role in ensuring product excellence, maintaining customer satisfaction, and safeguarding process integrity throughout the production of luxury leather goods.

3.1 Material Quality Process

The Material Quality process is designed to ensure that raw materials (primarily leather and metal components) meet established quality standards prior to the commencement of production. Two distinct supply strategies are employed: Pré-coupe, in which the customer supplies the materials and assumes responsibility for their quality, and Kit, wherein ATEPELI procures the materials and conducts internal quality inspections upon receipt.
To facilitate clarity and ease of interpretation, the quality processes are represented using Business Process Model and Notation (BPMN) flowcharts. Figure 5 illustrates the sequence of events and associated documentation within the material quality workflow. Critical materials are subject to 100% inspection, while non-critical materials are assessed through a 10% sampling protocol. Materials that fail to meet quality standards are quarantined, and suppliers are promptly notified.
A key weakness identified in the current process is the lack of real-time traceability and visibility of material flows. This deficiency has led to misalignments between physical inventory and digital records, underscoring the need for improved integration between operational and information systems.

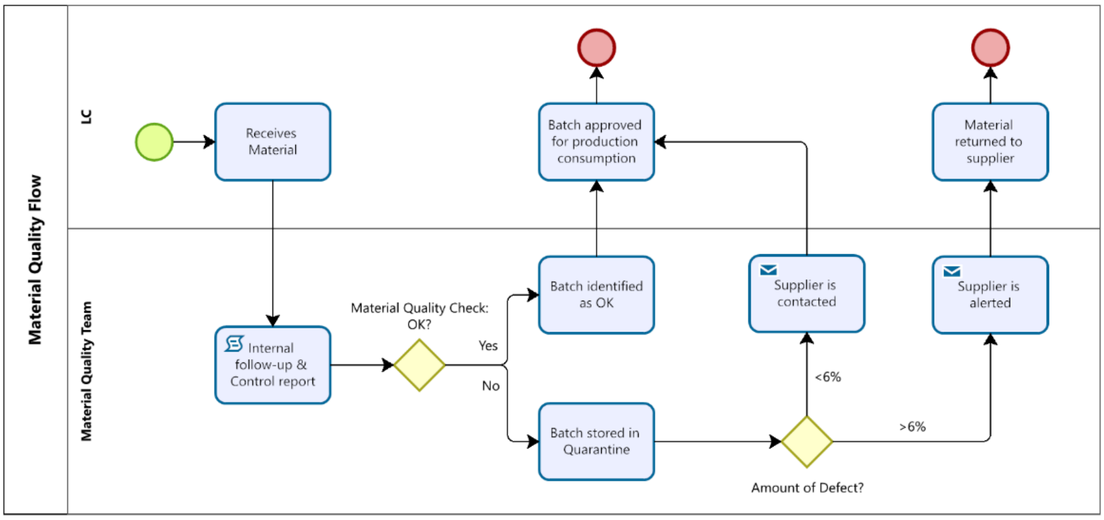

Figure 5. Flowchart of current material quality process

3.2 Operational Quality Process

The Operational Quality area is devoted to maintaining production standards and minimising internal defects throughout the manufacturing process. Figure 6 presents the BPMN diagram for the operational quality workflow. Operators receive training in self-inspection and are instructed to proceed only when components meet predefined quality criteria. Final inspections are conducted at the end of the production line, where non-conforming parts (referred to as KOs) are assessed: recoverable components are returned to production for rework, while unrecoverable items are classified as final

KOs and may either be destroyed or returned to the customer.
A significant challenge within this process is the reliance on an outdated and excessively detailed defect catalogue, comprising 82 distinct classifications. This complexity frequently results in misclassification and compromises the accuracy of internal non-quality indicators, highlighting the need for a streamlined and updated defect taxonomy.

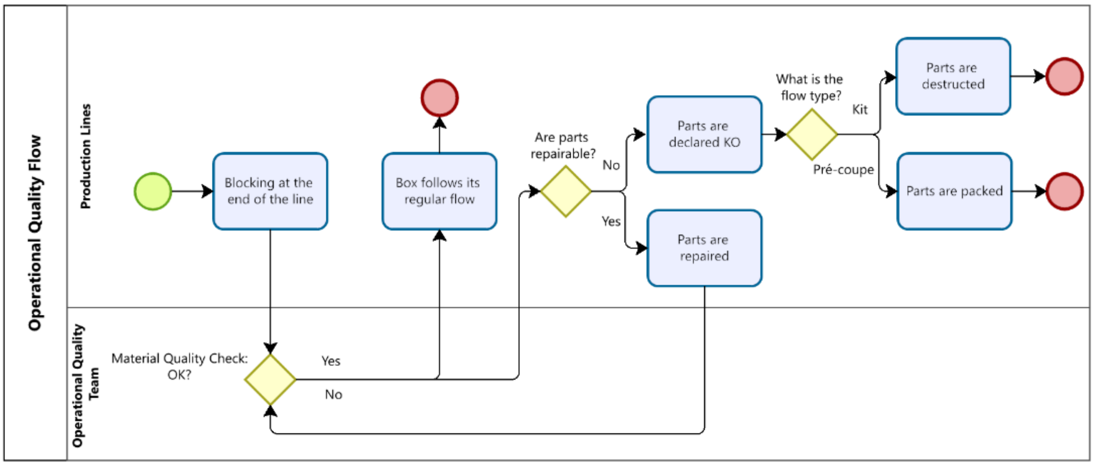

Figure 6. Flowchart of current operational quality process

3.3 Customer Quality Process

The Customer Quality process is responsible for managing product returns resulting from quality-related issues, operating under a strict resolution timeframe of 21 days as mandated by company policy. Figure 7 presents the BPMN diagram outlining this workflow. Returned products are initially assessed at the "Quality Wall," where they are documented within internal tracking systems and subsequently routed either for repair or disposal, depending on their condition. Although the standard repair time is set at five days, inefficiencies within the process frequently lead to delays, causing the actual turnaround time to exceed the targeted threshold. These delays highlight the need for process optimisation to ensure timely resolution and uphold customer satisfaction.

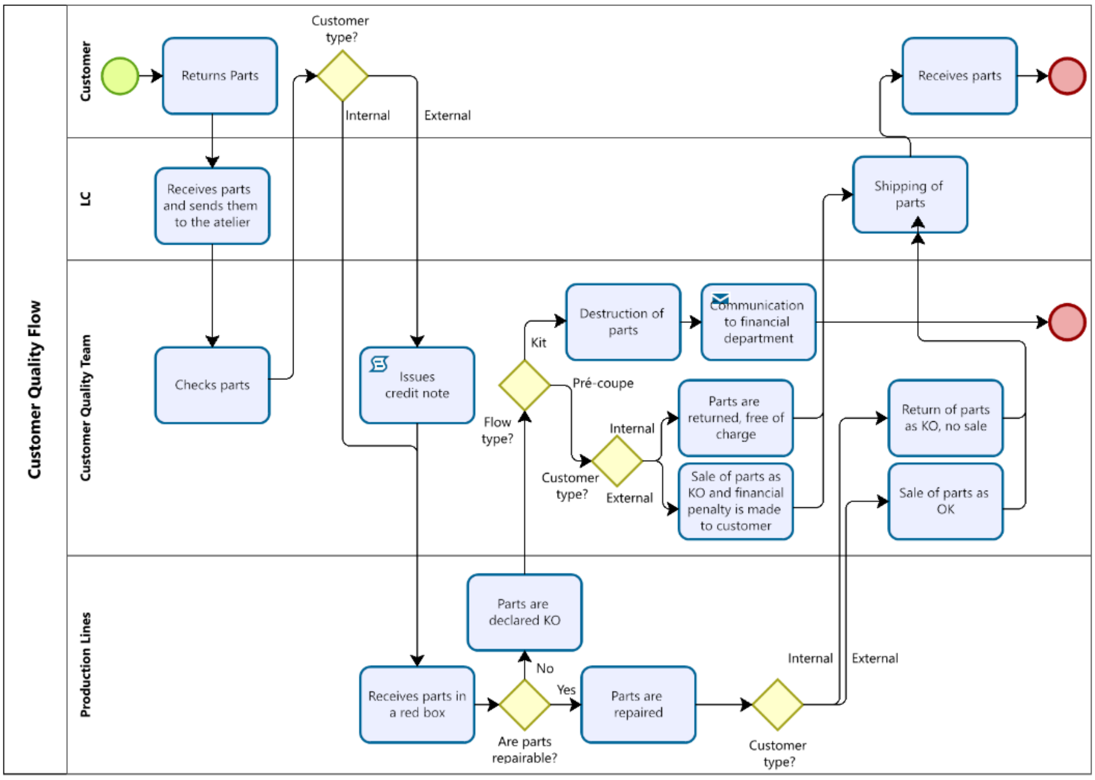

Figure 7. Flowchart of current customer quality process

The analysis of the current quality management processes has revealed several opportunities for improvement, particularly in the areas of traceability, defect classification, and the efficiency of return processing. These findings serve as the foundation for the integration of the SAP system, which is intended to enhance standardisation, improve data accuracy, and increase transparency across all quality-related activities.

3.4 Key Considerations

As pointed out previously, the analysis of the quality management processes at ATEPELI Ponte de Lima revealed several critical issues and opportunities for improvement across the three core quality areas. Potential solutions and their implementation strategies will be discussed in subsequent sections. Key challenges include the lack of traceability for raw materials, an issue expected to be addressed through the integration of the SAP system, the need to revise and streamline the defect classification list for accurate Key Performance Indicator (KPI) reporting, and the necessity of interim measures to manage return lead times prior to SAP's GoLive.

In the Material Quality process, a major issue identified was the discrepancy between physical inventory levels and those recorded in the internal software system. Upon receipt, materials were entered into the system and made available for production before undergoing inspection by quality technicians. This premature availability led to inaccurate data for production planners, as material readiness was not correctly reflected. Although each item was assigned a unique identification code upon storage, there was no enumeration of transfers, real-time tracking, or documentation of material movement. As a result, materials physically located in the Quality Control (QC) area were still listed as being in the warehouse, rendering the digital inventory data unreliable.

Within the Operational Quality process, a significant challenge was the accurate identification and classification of defects during the declaration of non-conforming parts (KOs). Defects detected during production were recorded using a company-provided list comprising 82 items. Due to the list's length and outdated entries, employees frequently encountered difficulties in selecting the appropriate defect classification, resulting in discrepancies between actual and recorded defects. This misclassification compromised the accuracy of internal non-quality KPIs and risked the implementation of corrective actions that failed to address the true root causes.

The analysis of the Customer Quality process highlighted a persistent bottleneck: the inability to consistently meet the 21-day turnaround time for processing product returns. Overall processing times were heavily influenced by the efficiency of the repair production line. Although the standard repair duration is estimated at five days, delays frequently extend the total resolution time beyond the prescribed limit, underscoring the need for process optimisation and enhanced workflow coordination.

4. INCREMENTAL STEPS TOWARDS CHANGE

This section outlines the adjustments made to the quality management processes in preparation for the upcoming implementation of the SAP system. Several changes were strategically planned and progressively introduced at ATEPELI Ponte de Lima, informed by valuable insights gained from prior SAP deployments at two other ateliers: Penafiel and Santa Maria da Feira.

4.1 Shopfloor Layout Modifications

Substantial modifications were introduced to the shop floor layout to accommodate the requirements of SAP integration, as illustrated in Figure 8 (in comparison with the initial layout shown in Figure 2). These changes aimed at enhancing operational efficiency and improving production dynamics. A key improvement was the establishment of a third preparation line for leather goods (PLG3), specifically designed to supply the Alma and Speedy toron lines, as well as the Capucines line. Previously, these lines were served by PLG1 and PLG2, which have now been reallocated exclusively to the production of flat components (CP).

Figure 8. New shop floor layout of the ATEPELI Ponte de Lima – Calvelo atelier

This strategic reorganisation necessitated a reconfiguration of production flows among the lines, as depicted in Figure 9, enabling a more streamlined and specialised workflow across the atelier.

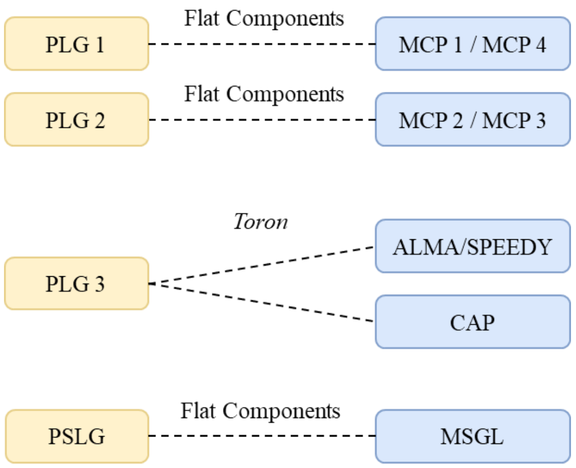

Figure 9. New workflow scheme between production lines

This restructuring facilitated the implementation of a milk run system within the manufacturing setup, significantly improving the efficiency of material handling and internal transport. To support this logistical enhancement, a dedicated area for cutting tools was established, consolidating resources and improving accessibility for operators.

4.2 Incremental Steps in Operational Quality

As previously noted, a quality check is conducted at the end of the production process as part of the operational quality workflow. When necessary, a secondary assessment is performed by a member of the Quality team. Initially, this involved physically transferring components to a designated area known as the "Quality Wall Area." However, based on insights gained from SAP implementations at other component ateliers, this procedure was revised. The secondary quality check is now carried out directly at the end of each production line by the Quality team. This adjustment addresses inefficiencies associated with moving parts between production lines and the Quality Wall, which previously resulted in time delays and production bottlenecks. Furthermore, it enhances communication between the Quality Department and production teams, enabling faster and more effective issue resolution.
To support this revised process, standardised Quality Control (QC) stations were installed at the end of each production line (Figure 10). These stations allow Quality Wall personnel to quickly relocate to any line, connect and configure their laptops in designated ergonomic workspaces, perform product inspections, and print labels efficiently.
Proposed changes to the defect list were carefully evaluated to ensure consistency across all divisions within the group as part of the SAP implementation. To this end, a task force comprising representatives from all three component ateliers was established. The primary objective was to develop a unified defect classification system that could be seamlessly integrated into the SAP platform and applied uniformly across all operational areas.

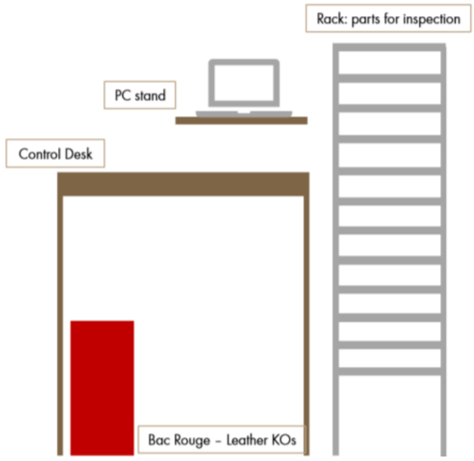

Figure 10. Draft for the QC station

In developing the revised list, particular attention was paid to two critical factors: ensuring the system is intuitive and user-friendly for production staff, and guaranteeing that the recorded data effectively informs KPIs and supports strategic decision-making aimed at addressing existing quality issues.
To achieve these goals, a hierarchical structure was adopted for the defect list, as illustrated in Figure 11. The list is organised into four major categories based on the stage of the production process at which defects are identified: KO Material, encompassing defects related to acquired materials or those arising during cutting; KO Preparation, covering defects detected or caused during the preparation phase; KO Assembly, including defects identified within the assembly lines; and Missing Part, which refers to material shortages that prevent the completion of a full batch of 30 units. The first three categories contain detailed sub-classifications corresponding to specific processes where defects may occur, while the "Missing Part" category remains singular due to its exclusive focus on inventory insufficiency.
The development of the updated defect list, presented in Figure 11, has had a significant and essential impact on the accuracy of quality-related Key Performance Indicators (KPIs). By enabling precise identification of defect origins, the Quality Department can now direct improvement efforts more effectively, targeting specific processes or operational areas requiring intervention. Previously, defects arising during the leather cutting process were frequently misclassified as material quality issues, erroneously suggesting deficiencies in procurement. In reality, these issues stemmed from inadequate control over cutting operations. The revised categorisation addresses such misinterpretations, thereby enhancing the reliability of internal quality metrics.
Defects associated with cutting, along with other blue-coded entries across categories, now contribute to

internal process KPIs rather than those linked to material procurement, which are indicated by yellow coding. Additionally, issues related to customer-supplied materials within the pré-coupe flow are marked in orange, allowing for clear differentiation from internal procurement concerns and facilitating targeted collaboration with customers. Defects coded in green represent miscellaneous errors not directly tied to production processes; while these may disrupt order fulfilment, they do not influence quality KPIs.

KO Material	KO Preparation	KO Assembly	Missing Part
Off-guide appearance	P Sewing machine	M Sewing machine	
Leather detachment	P Manual sewing	M Manual sewing	
Dimensional leather	P Colour batch	M Robot sewing	
Leather thickness	P Colour unit	M Colour batch	
KO supplier (pré-coupe)	P *Surcoupe*	M Colour unit	
Sangle	P *Filetting*	M Ramped	
Fabric	P *Griffe*	M Negative equalised	
Metallic piece	P Gluing	M Gluing	
Leather	P Equalised	M Thread burning	
Synthetic	P Ramped	M *Filetting*	
	P *Rembordage/Cassage*	M *Griffe*	
	P Thermo gluing	M Surcoupe	
	P Detachment	M Crimping	
	P Crimping	M Metallic piece	
	P Leather matching	M Detachment	
	P Decentring	M Filing	
	P Filing	M Leather matching	
	P *Arrasage/Enrobage*	M Thermo gluing	
	P Application DF/*similis/fentes*	M Decentring	
	P Guillotine	M Application DF/*similis/fentes*	
	P Thread burning	E Development error	
	E Development error	E KO Machine	
	E KO Machine	E Error material / consumables	
	E Error material / consumables	E Quality (Lab part, ref)	
	C Reinforcements/*Simili/Scie*	C Reinforcements/*Simili/Scie*	

- Defects caused by manufacturing processes
- Defects caused by customer-supplied materials
- Defects caused by material procurement
- Errors

Figure 11. New defect identification list

4.3 Incremental Steps in Material Quality

The Logistics and Cutting building was constructed to accommodate certain infrastructural changes necessitated by the implementation of the SAP system. Consequently, the Material Quality station was relocated to this facility without a comprehensive assessment of the optimal layout or the physical flow of materials. In an effort to improve material quality processes, modifications are currently being undertaken within the designated area.

The layout of the Material Control Area has been redesigned, as illustrated in Figure 12, with careful consideration given to the physical flow of materials and the integration of SAP functionalities for managing both metallic components and leather materials. In this revised configuration, the metallic control technician is solely responsible for executing the complete control process within the area, whereas the leather control technician is limited to performing administrative tasks. Notably, the physical inspection and control of leather materials continue to be conducted in the warehouse where these materials are stored.

The quality control process for metallic components follows the sequence illustrated in Figure 14. Upon delivery to the warehouse, the boxes are initially placed on the entry pallet (1). The metallic control technician then classifies the boxes based on the required inspection level. For the Capucines product line—a more exclusive category—100% of the components are subjected to inspection. For other product types, the boxes are directed to the 10% control pallet, where only one in every ten items is inspected (2).

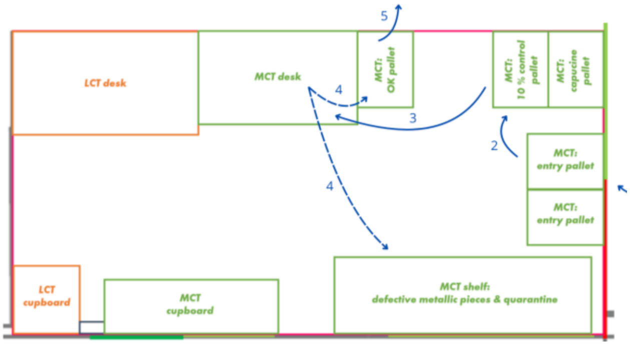

Figure 12. Layout of the Material Control Area (1 – Entry of material; 2 – Segregation according to control level; 3 – Control of materials; 4 – Placement in OK or defective area; 5 – Storage of OK parts.)

Subsequently, the technician performs the inspection at the designated workstation (3). If the components meet the established quality standards, the corresponding box is transferred to the "OK" pallet. In cases where defects are identified or the quality is uncertain, the items are placed on a shelf either in the quarantine section—pending further evaluation by supervisors—or in the defective section, designated for return to the supplier (4). Finally, metallic components that pass inspection are collected by the warehouse team and stored in their assigned locations, ready to be dispatched to the production lines (5).

4.4 Incremental Steps in Customer Quality

As previously discussed, the 21-day lead time for processing product returns was not consistently met. To address this challenge and align with the SAP system's requirement for strict adherence to return timelines, the return management technician implemented proactive measures. Specifically, the technician began retrieving red boxes from production lines within five days of placement, irrespective of the repair status. This five-day period corresponds to the time allocated for repairs within the production line. When combined with shipping and administrative processing durations, it constitutes the full 21-day lead time. Any items remaining beyond this timeframe are automatically classified as non-conforming (KO) by the technician, thereby improving compliance with established deadlines.

In addition, a new column titled "Temps de Réparation" (French for "repair time") was introduced into the internal Excel-based returns management system (see Figure 13). This feature automatically calculates the time elapsed between product arrival and departure, providing a clear visual indicator of any deviations from the stipulated 21-day resolution window.

ANALYSE ATEPELI	
DÉFAUT	TEMP DE RÉPARATION
Collage	34
Collage	34
Collage	34
Collage	34
Collage	34
Collage	45
Collage	45
Cuir	20
Coloration	20
Coloration	20
Coloration	20
Coloration	20
Piqûre	9
Montage	13
Cuir	2
Cuir	2
Cuir	9
Piqûre	2
Cuir	2
Cuir	2
Sertissage	9
Cuir	9
Piqûre	2
Cuir	2

Figure 13. Internal Excel follow-up file for return management

Special attention was also devoted to the identification and documentation of customer returns. To address this need, a comprehensive instruction manual was developed, outlining best practices for returns management in alignment with SAP system requirements. This manual was distributed to the company's clients two months prior to the SAP implementation, with the objective of familiarising them with the new procedural standards and mitigating potential disruptions.

The manual specifies the required documentation for processing returns, details the handling of production labels, including a replacement label template in case of loss (Figure 14), and provides guidance on packaging to prevent damage during transit. Additionally, it includes instructions for correctly labelling return packages (Figure 15), thereby ensuring consistency and traceability throughout the returns process.

Code J: ____________

OF: ____________

Etiquette n°: ____________

Qt KOs: ___/___

Défects: ____________

Figure 14. Template for replacement traceability label, included in the instruction manual for returns

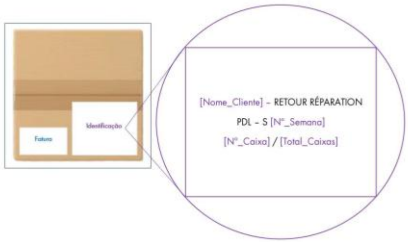

Figure 15. Identification scheme for returning boxes, included in the instruction manual for returns.

4.5 Main Changes in Quality Processes

To align ATEPELI Ponte de Lima's quality control processes with SAP system requirements, two major adjustments were implemented: the integration of QR-code tagging across all relevant operational areas and the adoption of a dynamic approach to material control. In terms of quality procedures, each necessary area was identified and tagged with a QR code linked to a specific digital location within the SAP system. This integration enables the use of Personal Digital Assistant (PDA) devices to accurately associate the physical location of each product with its corresponding data in the system in real time (Figure 16).

Figure 16. QR-code tags for SAP

Within the Material Quality workflow, the implementation of SAP introduced a significant enhancement in determining the frequency of quality control for each product. As illustrated in Figure 17, the new system enables a dynamic material control process in which each part number, categorized by supplier, is assigned a quality level within SAP: Level 1, 2, 3, or 4.

Level 1 ("New") mandates full inspection of the entire batch. If the batch passes quality control, it is automatically promoted to Level 2 ("At Risk – Previous Delivery KO"). Level 2 ("At Risk – Atelier Alert") may also be manually assigned to a reference by an employee. Upon successful inspection, a Level 2 batch advances to Level 3 ("Low Risk"), where only one in every three deliveries is subject to inspection. If a Level 3 part number passes control, it progresses to Level 4 ("Occasional"), in which only one in every fifty deliveries requires inspection by a technician.

Should a part number fail inspection (KO) at any stage, it is automatically reassigned to Level 2 ("At Risk"), regardless of its previous classification. This dynamic system enables material quality technicians to concentrate their efforts on items with a higher likelihood of non-conformance, thereby optimizing resource allocation and reducing overall workload.

Figure 17. Scheme of the material control dynamic for material quality

Within the Operational Quality workflow, SAP facilitated the implementation of a standardized defect list, as presented in Figure 11. The outcome of this implementation is depicted in Figure 18, which organizes defect data into four primary categories: KO Leather, KO Preparation, KO Assembly, and KO Missing Part. This structured defect classification provides the Quality Department with enhanced visibility into the nature and origin of defects, thereby supporting more effective root-cause analysis and corrective actions. Furthermore, it enables more precise calculation of key performance indicators (KPIs) and helps identify specific areas requiring improvement across procurement, logistics, and production processes.

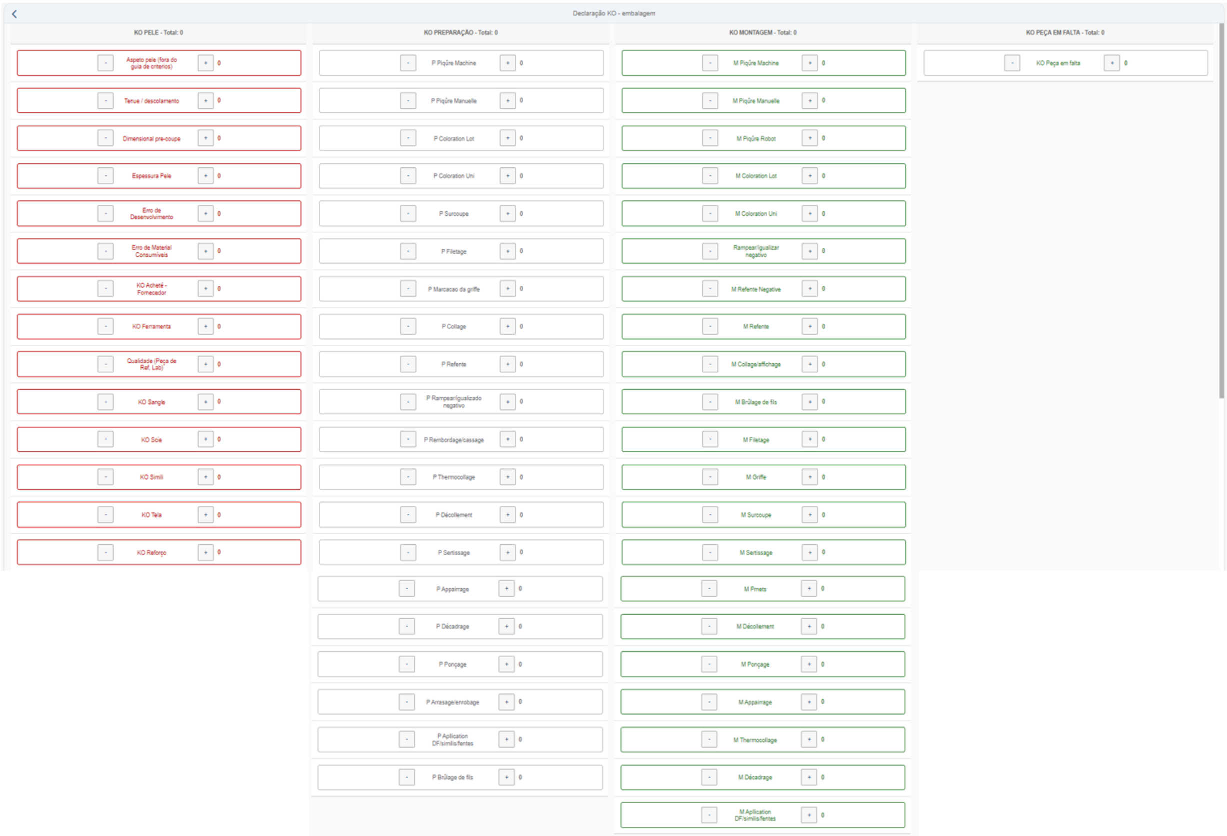

Figure 18. Defect list screen of SAP

5. CONCLUSIONS

To remain competitive in a rapidly evolving market, continuous process improvement is essential for reducing costs, eliminating inefficiencies, and enhancing overall competitiveness. This study explored strategies for optimizing quality management processes in the luxury leather goods sector, with a particular emphasis on integrating SAP systems to align quality with sustainability. It offers valuable insights into how context-specific SAP implementations can support operational excellence without compromising artisanal craftsmanship.

The research identified critical gaps in material quality, operational quality, and customer quality processes, revealing opportunities for strategic enhancement. By employing BPMN flowcharts to map each process area, several improvements were introduced, yielding measurable benefits for quality management. Notable initiatives included the establishment of quality control (QC) stations at the end of each production line, the implementation of a hierarchical defect classification system, and the enforcement of strict return lead times. These measures represent significant milestones in the company's continuous improvement journey, enhancing its capability, resilience, and readiness to meet future challenges while maintaining high standards of service excellence.

The introduction of QC stations improved efficiency by reducing production delays and enhancing communication between the quality and production teams. The hierarchical defect list made the system more accessible to production staff and more effective in influencing KPIs, thereby guiding performance improvements and addressing issues more efficiently.

The new dynamic material control process significantly reduced the workload associated with manual inspections, improved material traceability, and minimized inventory errors. This not only enhanced operational efficiency but also supported sustainability goals by reducing waste and optimizing resource utilization.

By adopting an integrated approach to quality management, this research provides valuable guidance for other luxury goods manufacturers seeking to improve operational efficiency, quality standards, and sustainability practices. It also lays the groundwork for future research and development in this area. However, the absence of comparative frameworks or benchmarking with other industries or ERP systems limits the generalizability of the findings. Future studies could explore cross-industry patterns or develop standardized methodologies for quality process integration in SAP environments particularly within the luxury leather sector.

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