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ARTIFICIAL INTELLIGENCE IN THE HABITAT INDUSTRY

STRATEGIC OPPORTUNITIES AND CHALLENGES FOR SMEs

Victor Vilar San José^(*)

Abstract. Artificial intelligence (AI) is transforming the world and, directly, the habitat industry. This study analyses that impact from a business perspective with a dual purpose: (i) to interpret emerging opportunities and risks —productivity, cost structure and professional profiles— and (ii) to translate them into a roadmap that can be implemented in micro and small businesses (SME) in the sector.

This study proposes a **practical guide for integrating artificial intelligence (AI) tools into the workflows of micro and small enterprises** in the habitat design sector. Through a mixed-method approach, combining qualitative analysis of organizational structures and quantitative assessment of economic impacts, the research examines a representative small-medium enterprise with 10 professionals and identifies key workflow stages—management, ideation, work in progress, presentation, and product development—and suggests tailored AI tools, such as Microsoft Copilot, Power BI, and Rhino with Grasshopper, to enhance efficiency. A progressive implementation roadmap is proposed, based on tools already integrated within existing ecosystems (Microsoft Copilot, Power Platform, Rhinoceros, V-Ray and Adobe Substance 3D), thus enabling gradual adoption without disrupting established workflows.

The integration of AI makes it possible to automate repetitive tasks, enhance technical accuracy and accelerate the production of visual proposals and documentation, delivering tangible benefits in terms of productivity, time reduction, improved responsiveness and greater profitability. Finally, key performance indicators (KPIs)—such as average visual development time, client revision ratio and on-time delivery rate—are suggested to objectively measure the impact of these tools within the real context of a creative SME.

Keywords: AI in habitat-industry SMEs; AI workflow integration in design studios; Automation in furniture/interior design; Productivity KPIs in design practice; Parametric design (Rhino/Grasshopper); PBR rendering for furniture; Copilot and Power BI in creative SMEs; Change management for AI adoption.

Resumen. La inteligencia artificial (IA) está transformando el mundo y, de forma directa, la industria del hábitat. Este trabajo analiza ese impacto desde una perspectiva empresarial con un doble propósito: (i) interpretar las oportunidades y riesgos emergentes —productividad, estructura de costes y perfiles profesionales— y (ii) traducirlos en una hoja de ruta implantable en micro y pequeñas empresas (PYME) del sector.

El trabajo propone una **guía práctica para la integración de herramientas de inteligencia artificial (IA) en los flujos de trabajo de micro y pequeñas empresas** del ámbito del diseño del hábitat. A través de un enfoque mixto, que combina el análisis cualitativo de las estructuras organizativas y la evaluación cuantitativa de los impactos económicos, la investigación examina una pyme representativa con un equipo de 10 profesionales e identifica las principales etapas del flujo de trabajo —gestión, ideación, desarrollo en curso, presentación y desarrollo de producto—, proponiendo herramientas de IA específicas como Microsoft Copilot, Power BI y Rhino con Grasshopper para mejorar la eficiencia. Se plantea una hoja de ruta de implantación progresiva basada en herramientas ya integradas en ecosistemas existentes (Microsoft Copilot, Power Platform, Rhinoceros, V-Ray y Adobe Substance 3D), lo que facilita una adopción gradual sin alterar los flujos de trabajo consolidados.

La integración de la IA permite automatizar tareas repetitivas, mejorar la precisión técnica y acelerar la generación de propuestas visuales y documentación, aportando beneficios tangibles en productividad, reducción de tiempos, capacidad de respuesta y rentabilidad. Finalmente, se sugieren indicadores clave de rendimiento (KPI), como el tiempo medio de desarrollo visual, la ratio de revisiones de cliente y el índice de entregas puntuales, para medir de manera objetiva el impacto de estas herramientas en el contexto real de una pyme creativa.

Palabras clave: IA en PYMES del hábitat; Integración de IA en flujos de trabajo de diseño; Automatización en estudios de diseño; KPIs de productividad en diseño; Diseño paramétrico (Rhino/Grasshopper); Renderizado PBR en mobiliario; Copilot y Power BI en PYMES creativas; Gestión del cambio para adopción de IA.

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1. INTRODUCTION. OBJECTIVES AND HYPOTHESES

The OECD defines the concept of Artificial Intelligence (AI) as “a machine-based system that, for explicit or implicit purposes, infers from the information it receives (input) how to generate results such as predictions, content, recommendations or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptability after deployment” (OECD, 2024).

Understood as systems capable of inferring and generating results from data, AI is reshaping business: it optimises processes, speeds up decisions and opens up new capabilities (Contreras, F. & Olaya, J.C., 2025). AI affects over 60% of workers in advanced economies (Georgieva, 2024), and by 2028, investment in this technology is expected to reach \$632 billion (Shirer, 2024), requiring businesses to rethink its adoption. However, this requires more than just technology: governance, interdisciplinary collaboration and a culture of continuous learning (Bieliaieva et al., 2024). The European framework (European Parliament, 2024) and recent public strategies in Spain and Andalucía (Junta de Andalucía, 2023; Ministerio para la transformación digital y de la función pública, 2024) have consolidated common ground for its responsible deployment. In the creative field, the evidence is consistent: AI streamlines repetitive tasks and enhances visualisation, but human judgement remains the core of value. The challenge (especially for micro and small businesses) is how to incorporate it with limited resources and without diluting the artisanal stamp.

This work is the result of a professional career in furniture and habitat, complemented by training in Interior Design to understand the relationship between object, space and user. Direct observation at international trade fairs and ongoing dialogue with designers, manufacturers and distributors reveal a common pattern: high interest, but operational disorientation. There is an abundance of specific evidence and aspirational discourse, but a lack of vision, sequence and

far-reaching decisions that would allow AI to be integrated without diluting the artisanal identity and personalised service that characterise the sector.

This project is an applied response to a real need of SMEs in the habitat sector: to clarify the why, the what for and the how far of AI adoption. It limits its scope to organisational and process improvement—not aesthetic debates—identifies risks (task displacement, technological dependence, training gaps) and guides decision-making towards verifiable and sustainable benefits.

1.1 OBJECTIVES

The main objective is to analyse and propose the integration of artificial intelligence tools in SMEs in the furniture and interior design sector, using a typical company with a representative structure and workflow as a reference.

With these specific objectives:

- To **describe the organisational structure** and workflow of a creative SME dedicated to furniture and interior design, to identify areas for improvement.
- To **detect repetitive or low-value tasks** that consume time in the design, development and project management process.
- Select the **most appropriate artificial intelligence tools for each stage** of the workflow, prioritising compatibility with the existing software.
- Propose a **plan for the progressive integration of AI** that improves efficiency without radically altering current systems or the organisational structure.
- Estimate the **impact on productivity and profitability** resulting from the application of these technologies, establishing indicators (KPIs) to measure results.
- Reflect on the opportunities and challenges that AI represents for SMEs in the sector, providing a **practical guide applicable to other** similar companies.

1.2. HYPOTHESES

This study is based on the following research hypotheses:

- Artificial intelligence tools can significantly **reduce production times and improve productivity** in design companies.
- The adoption of AI in this type of company

is more effective when it is integrated into the tools already used by work teams.

- Process optimisation with AI in design SMEs will result in **higher productivity and improved profit margins.**
- **A gradual and well-planned integration of AI can strengthen the competitiveness of creative SMEs** without compromising their identity or the added value of human labour in the creative process.

2. METHODOLOGY

This research adopts a mixed-methods approach combining qualitative and quantitative analysis to provide a pragmatic roadmap for micro and small enterprises:

Qualitative analysis to model the internal organisation of a representative SME (10–25 employees) and to map roles, tasks and cross-departmental collaboration along the end-to-end design workflow.

Quantitative estimation to assess the economic impact of AI adoption, considering subscription costs, time savings in specific tasks, and productivity effects. The analysis

defines a compact KPI framework (e.g., time per project, percentage of tasks automated, error rate in technical documentation) to monitor improvement over time.

Study sample: a real, small furniture/interior design firm with five functional departments (Management, Ideation, Work/3D & Visuals, Presentation, Product Development). Client profiles are characterised to capture different collaboration models (e.g., brand royalties, direct B2B services, factory partnerships).

Evidence gathering through a structured literature review and sector cases, complemented by practitioner insights obtained in international trade fairs and industry interactions during 2025.

2.1 STUDY SAMPLE AND CLIENT PROFILES

An SME (small and medium-sized enterprise), according to the official definition of the European Commission (2003), is a company that employs fewer than 250 people and also meets one of the following two financial criteria: it has an annual turnover not exceeding €50 million or an annual balance sheet total not exceeding €43 million. This classification includes: micro-enterprises (fewer than 10 employees and up to €2

million in turnover or balance sheet total) and small enterprises (fewer than 50 employees and up to €10 million). This study focuses specifically on micro and small enterprises, which make up approximately 97% of the business network in the furniture sector in Europe (85% micro enterprises and 12% small enterprises), thus clearly representing the predominant structure of the sector. (Eurostat, 2024).

The study focuses on a real micro-enterprise in the furniture/interior design sector, with ~10 professionals and four functional departments. Operations Department (led by the Chief Executive Officer), Design Department (led by the Design Director), 3D & Visuals Department (led by the 3D & Visuals Manager) and Product Development Department (led by the Product Development Manager).

Three client profiles structure the business model:

1. **Furniture Brands.** The studio charges a royalty of 2–4% on the retail price of each unit sold, generally with quarterly payments.
2. **Factories.** which commission products directly from the studio to include them in their own catalogue. The studio collaborates in the technical development and receives a percentage of the sale price of each unit that the factory sells to the brands.
3. **Wholesale.** which act as representatives of the design. They commission products from the studio and, once developed and prototyped, offer them to interested brands. This configuration supports a flexible, scalable operation and allows extrapolating the findings to similar firms.

3. DEVELOPMENT

3.1 SME DESCRIPTION AND END-TO-END WORKFLOW

The organisational structure and sequence of phases together define how a furniture and interior design SME operates. The phases represent the operational path of the project, while the structure provides the roles, governance and resource allocation; both levels are interlinked through the cross-functional participation of different profiles.

The flow is organised into five main stages, coordinated with the departments involved:

- **Management.** Project initiation based on a commission or opportunity; definition of objectives, scope, budget and deadlines, as well as the commercial and creative strategy that frames subsequent development.
 - **Ideation (IIP – Ideation in Progress).** Generation of conceptual proposals based on inputs from Management: research of references, mood boards and sketches to establish the aesthetic-functional approach of the product or space.
 - **Work in Progress (WIP).** Transferring ideas to 3D models; technical phase in which proportions, materials and visual configurations are adjusted using modelling and rendering tools.
 - **Presentation (PIP – Presentation in Progress).** Preparation of the proposal for the client: presentations, final renders and visual narrative to facilitate validation prior to technical development.
 - **Product development (PD – Product Development).** Once the proposal has been approved, preparation of technical documentation and coordination with manufacturing: plans, dossiers and prototypes until a market-ready product is achieved.
- This integrated structure and process system is neither linear nor rigid: it incorporates feedback loops that allow the information generated in advanced phases to adjust decisions in previous stages, optimising both creative quality and technical efficiency and resource allocation.

3.2 AI INTEGRATION BY WORKFLOW STAGE

After studying in detail the organisational structure and phases, a concrete and realistic proposal is put forward to integrate artificial intelligence (AI) into each stage.

The vision that guides the work is clear: AI does not replace human talent; it operates as a

cross-cutting lever that makes creative, technical and management teams more efficient, reduces repetitive tasks, improves decision-making and raises quality in less time. This is not a disruptive replacement of the essence of design, but rather a strategic evolution that enhances capabilities and strengthens competitiveness in a demanding global market. The combination of a clear organisational structure and a step-by-step flow also facilitates progressive and specific implementation by area and responsibility.

Management stage (CEO and Office Manager). Key tasks: financial management, sales analysis, commercial relations, strategic vision. Suggested AI applications:

- **Automatic financial analysis:** Power BI connected to ChatGPT transforms PDF/Excel documents into interactive dashboards that show which products, finishes or regions generate the most sales, facilitating strategic decision-making.
- **Contract review with AI:** Tools such as Evisort or ThoughtRiver analyse international contracts and highlight risky clauses or unusual conditions, reducing manual review time.
- **Strategic content generation:** ChatGPT or Copilot help to draft briefs, manifestos and corporate communications in a clear and coherent manner, tailored to the furniture sector.

Ideation Stage (IIP) (Design Director). Key tasks: product/space ideation, trend detection, conceptual proposals. Suggested AI applications:

- **Reading photographs from trade fairs and visual insights:** Azure AI Vision/Clarifai to extract patterns (colour, materials, shapes) from photos and catalogues.
- **Real-time trends:** Pinterest Trends + Power Automate/Power BI for alerts on aesthetic or functional trends.
- **Generative mood boards:** Freepik / OpenArt / Getimg to accelerate early inspiration.
- **Naming and storytelling:** Copilot / ChatGPT for product name and narrative proposals.

Work in Progress (WIP) stage (3D & Visuals Manager, Design Director, Designers). Key tasks: 3D modelling, rendering, materials, technical supervision. Suggested AI applications:

- **Parametric modelling and automation:** Rhino + Grasshopper + Python scripts to reduce repetitive tasks.
 - **Smart rendering:** KeyShot Studio AI/ Lumion Pro (AI upscaling) to optimise lighting and resolution.
 - **Generative PBR materials:** Adobe Substance 3D (AI) for realistic textures from photos or prompts.
 - **Fast conceptual renders:** mnml.ai/ Freepik.
- Presentation Stage (PIP) (CEO, Design Director).** Key tasks: preparing presentations, selling the design to the client. Suggested AI applications:
- **Corporate automation:** Copilot in PowerPoint for slides based on reports/documents.
 - **Creative presentations:** Plus AI / Decktopus / Gamma for dynamic materials aimed at the target audience.

Product Development Stage (PD) (Product Development Manager). Key tasks: technical drawings, prototypes, coordination with factories. Suggested AI applications:

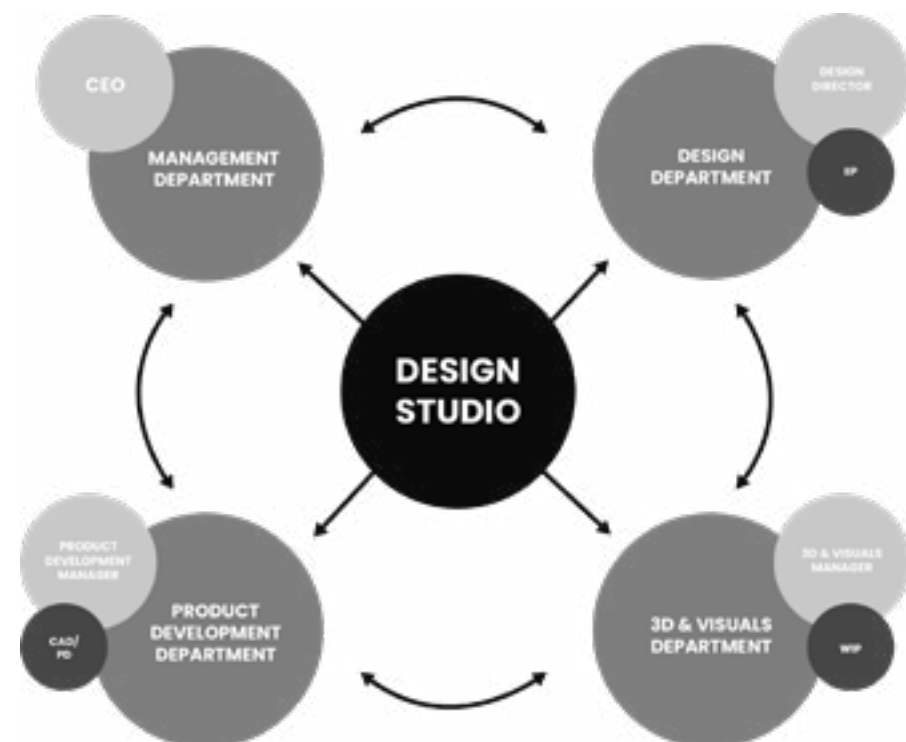
- **Dimensioning and drawing standards:** Rhino + Grasshopper + Python for automatic dimensions and consistent criteria.
- **Technical validation:** SolidWorks with AI to detect inconsistencies, collisions and assembly errors.
- **Manufacturing documentation:** DraftAid / Autodesk Fusion 360 (AI) for drawings based on 3D models and cloud collaboration with version control.

These applications are a starting point that can be adapted to the size, capabilities and budget of each SME. The key is to think of AI as an intelligent ally: it frees up time, increases precision, enriches creative processes and improves the customer experience, without blurring the studio's identity.

3.2.1 IMPLEMENTATION PROPOSAL

For the defined company model, which combines the Microsoft ecosystem with Rhinoceros and V-Ray as its main design and visualisation tools, a specific AI implementation is proposed to boost efficiency across all stages without radically changing the existing system. The approach focuses on integrating Microsoft Copilot and Power Platform as a transversal core for management, ideation, and presenta

Figure 1
Departmental distribution of the study.



Note. The study as a hub connected to Operations, Design (IIP), 3D & Visuals (WIP) and Product Development (CAD/PD). Key roles (CEO, Design Director, Product Development Manager, 3D & Visuals Manager) and bidirectional work/feedback flows between the core and each department are indicated. Source: own elaboration (2025).

tion, complemented technically by parametric automation in Rhinoceros through Grasshopper and Python, along with emerging AI features in V-Ray and Adobe Substance 3D for materials and rendering. This combination aligns with the company’s current infrastructure, ensuring compatibility, data governance, and a reduced learning curve by remaining within familiar environments.

The implementation is planned over twelve weeks in progressive phases. First, Copilot and Power BI would centralise indicators and standard contracts. Next, trend analysis and automatic moodboard generation would be added. Then, smart material libraries in Substance and V-Ray assistants would be deployed. Finally, Rhinoceros would incorporate automated drawings and schedules, supported by versioning and notifications via Power Automate. Brief role-based training and a best-practice manual with prompts and procedures would minimise resistance to change and secure operational continuity.

3.3 KPI FRAMEWORK AND MEASUREMENT OF IMPACT

The incorporation of artificial intelligence (AI) into the workflow significantly reduces the time spent on repetitive, low-value tasks. This effect translates into three operational le-

vers: increased productive capacity—the same team can handle more projects in less time; improved margins—by reducing internal hours per project; and scalability—the possibility of growing turnover with or without expanding the workforce, depending on the strategy. In the medium term, adoption behaves like an investment with a return, optimising resources and shortening the response to the market.

To evaluate the impact accurately, it is essential to measure with objective and comparable indicators between ‘with AI’ and ‘without AI’ scenarios, using samples of equivalent projects (scope, complexity, client). The following main KPIs are proposed:

- **KPI 1 • Average visual development time per project** (h/project). Hours from the first 3D modelling to the final render.
- **KPI 2 • Client review ratio** (iterations/project). Average number of rounds until approval. More accurate visualisations should reduce this value.
- **KPI 3 • Delivery punctuality** (% on time). Percentage of projects delivered on or before the agreed date.

Supporting metrics may include the volume of projects delivered per period and customer satisfaction (short post-delivery surveys), always

maintaining criteria of homogeneity in the samples.

Together, these KPIs replace hypothetical estimates with applicable and verifiable evidence, allowing each company to contextualise and quantify the effect of AI according to its structure, processes and business model.

3.4 OTHER CHALLENGES IN IMPLEMENTATION

Although this paper cannot address all aspects in depth, this section outlines those that will also be important to consider when implementing AI in the company.

3.4.1 DATA ETHICS AND GOVERNANCE

AI adoption requires a governance framework covering the full data lifecycle. In SMEs, this can be lean: assign a governance officer to manage records of algorithmic decisions, bias/performance audits, DPIAs, and data minimisation. Suppliers should provide model cards, contractual safeguards, and incident response procedures.

3.4.2 TRAINING AND CHANGE MANAGEMENT

Implementation is both cultural and technological. A continuous plan is proposed with: a competency matrix by role (management, design, visualisation, technical development); micro-training itineraries (prompts, copilot, CAD/BIM with AI, analytics) and ‘office hours’ sessions for real questions; stage-controlled pilots (Management, IIP, WIP, PIP, PD) with clear objectives and metrics; internal ambassadors to accompany the rest of the team; and incentive mechanisms (recognition of good practices, protected time for learning) that consolidate habits.

3.4.3 BENCHMARKING AND USE CASES

Documenting baselines (time, cost, satisfaction) and repeating measurements after adoption enables historical comparisons. Lessons from adjacent sectors can be transferred, while an internal repository of cases and snippets accelerates reuse.

3.4.4 TRENDS AND FUTURE

AI is evolving from a tool to infrastructure: native integration into design suites, unified interfaces and scalable licences. In the short term, it already offers ‘quick wins’ (automatic mood boards, upscaling, rendering/

post-production, descriptive analytics). In the medium term, multimodal convergence (text-image-3D), agents that chain tasks, and greater interoperability will promise more automatic and auditable workflows. This scenario requires standardisation of naming, metadata, and file conventions to ensure traceability and collaboration.

3.4.5 TACTICAL OBSOLESCENCE, LASTING PRINCIPLES

Given the pace of innovation, the tool catalogue is volatile. The strategy must be based on stable principles: **efficiency and simplification of workflow; automation of repetitive tasks; preference for versatile and well-integrated tools; maintaining AI as a creative and organisational collaborator**, not a substitute. On the technical side, opting for modular architectures, open APIs and standard exports reduces lock-in and facilitates component replacement. Evaluating the total cost of ownership (licences, training, integration time, risks) avoids short-sighted decisions.

3.4.6 SECURITY, COMPLIANCE AND QUALITY

In addition to the General Data Protection Regulation, it is advisable to define internal policies for version control, data retention and environment segregation (testing/production), as well as lists of sensitive data that is not authorised for training or prompting models. Quality is maintained with stage-by-stage checklists, acceptance criteria and human-AI cross-checks, avoiding hallucinations and ensuring documentary consistency.






3.4.7 METRICS-BASED OPERATION

Adoption must be measurable: select a limited set of KPIs (average time per task, review ratio, delivery punctuality, internal cost per project, customer satisfaction) and review them on a monthly/quarterly basis. The results feed into a continuous improvement loop (learning, tool adjustment, new automations), maximising return and minimising friction.

3.4.8 SUMMARY

These considerations are not peripheral: they form the backbone of secure, traceable and sustainable AI adoption that preserves creative identity while boosting competitiveness. By

Figure 2
 Implementation programme.

PHASE	AI - SOFTWARE	WEEKS											
		1	2	3	4	5	6	7	8	9	10	11	12
Managing													
Ideation													
Work													
Presentation													
Product Development													

combining governance, training, comparative evidence, technological vision and enduring design principles, SMEs can adapt and scale their model with confidence in a rapidly evolving environment.

4. CONCLUSIONS

The study confirms that AI is an effective lever for optimising processes in SMEs involved in furniture and interior design, but its adoption raises strategic and economic decisions that transcend the purely technical. The current ecosystem is driven by specialised start-ups (imaging, analysis, automation, creative assistance), which generates a broad and useful but fragmented catalogue with cumulative subscription costs. At the same time, large providers (Adobe, Autodesk, Chaos, Nvidia) are moving forward with partial features and seem to be observing the market: a scenario compatible with a future acquisition and integration strategy. If this happens, AI could be incorporated natively into the usual suites (Photoshop, AutoCAD/Revit, V-Ray), simplifying the learning curve; however, the question remains about the impact on prices and the risk of a competitive gap between those who can afford 'AI' licences and those who cannot. The best scenario for SMEs would be a democratisation of these capabilities (staggered plans or standard inclusion), accompanied by policies that facilitate adoption and prevent inequalities.

Rather than the fear of job displacement, the concern is that companies will be unable to afford integration and will be excluded from productivity gains. Hence the need to combine innovation with data governance, training and total cost of ownership criteria.

4.1 HYPOTHESIS EVALUATION

- **Hypothesis 1.** The integration of artificial intelligence reduces the time spent on repetitive, low-value tasks. **Confirmed.**
- **Hypothesis 2.** The adoption of AI is more effective when it is integrated into tools already used by the company. **Confirmed.**
- **Hypothesis 3.** Reducing operating times translates into a positive economic impact. **Partially confirmed.**
- **Hypothesis 4.** Progressive integration of AI strengthens the competitiveness of SMEs without compromising creative value. **Confirmed.**

4.2 OBJECTIVE EVALUATION

Describe the organisational structure and workflow of an SME in the sector. **Achieved.**

- Identify repetitive or low-value tasks. **Achieved.**
- Select the most appropriate and compatible AI tools. **Achieved.** - Propose a plan for the progressive integration of AI. **Achieved.**
- Estimate the impact on productivity and profitability using KPIs. **Achieved.** - Reflect on opportunities and challenges. **Achieved.**

4.3 FINAL RECOMMENDATION

Adopt AI gradually and in a controlled manner, integrated into the existing stack, with operational KPIs and ongoing training; monitor market developments (consolidation and prices) and promote measures that guarantee access to key capabilities. Under these conditions, adoption is viable, advisable and consistent with preserving the studio's creative identity.

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