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**Intelligent Knowledge
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Corvinus University of Budapest
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Co-Creation of Knowledge in Marketing: Human-AI Collaboration in the Construction of Proto-Personas

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Abstract

This study investigates, through the lens of the Knowledge Management 5.0 (KM 5.0) paradigm, the role of Generative Artificial Intelligence (GAI) as a partner in the co-creation of knowledge for the development of proto-personas within the context of data-driven marketing. The research addresses the challenge of understanding consumer behaviour in niche markets – in this study, the bonsai market – which are characterised by a scarcity of structured data and a predominance of tacit context.

An applied qualitative approach was adopted, with an exploratory-descriptive design. The study was conducted with 71 undergraduate students (67 valid responses; response rate of 94.4%) enrolled in Marketing courses at ESAG/Udesc. Participants interacted with a Generative Artificial Intelligence Agent (GAIA) named John Jobs Naka (J. J. Naka), configured using a specialised corpus derived from in-depth qualitative interviews with recognised sector experts, together with technical publications and secondary data. The methodological framework was structured on the SECI model (Socialisation, Externalisation, Combination and Internalisation) to enable the analysis of knowledge conversion processes in human-AI interaction.

The findings demonstrate that GAIA can function as a cognitive mediator, facilitating the externalisation and integration of knowledge while supporting the development of proto-personas as strategic marketing artefacts. The quantitative results indicate high levels of acceptance and perceived utility – 98.5% of participants recognised the agent as an effective partner; the clarity score was 4.19/5; and recommendability 8.57/10. Qualitative analysis highlights three key aspects: cognitive mediation, empathy and humanisation (aligned with H2H marketing), and epistemological integration of tacit and explicit knowledge.

This cutting-edge study represents an advancement of KM 5.0 by demonstrating the capacity of GAIA to enhance learning processes, support agile knowledge development and enable the generation of sophisticated consumer insights in niche markets. The findings also have relevant implications for the fields of marketing and higher education, positioning GAIA as scalable tools for the co-creation of knowledge while preserving human centrality in decision-making processes.

Keywords: Generative Artificial Intelligence Agent; Knowledge Co-creation; Proto-personas; Data-driven marketing; KM 5.0.

Paper type: Academic Research Paper

1 Introduction

The development of proto-personas in the context of data-driven marketing has emerged as a relevant exploratory practice for understanding consumers and markets, particularly in niche contexts characterised by a high degree of specialisation, tacit knowledge, and a lack of structured data. The bonsai segment is a typical example of such a niche.

In educational and organisational settings, efficient consolidation of quantitative and qualitative information, frequently drawn from specialised and difficult-to-access sources, is essential. GAI, when informed by a refined knowledge base, may assume the role of a supporting agent for the co-creation of market knowledge. In this study, the findings from in-depth qualitative interviews with recognised bonsai experts constituted the knowledge base. The generation of proto-personas by undergraduate Business Administration students, using a GAIA, illustrates a dynamic of human AI collaboration. Thus, interpretation, synthesis and contextualisation are not entirely delegated to technology, but rather constructed jointly, combining human expertise, empirical data and generative capacity of the system.

The aim of this article is to analyse how collaboration between ESAG/Udesc students and GAIA – configures on the basis of specialised knowledge co-creation in marketing through the construction of proto-personas that represent the ideal customer profile in the target market. The research is guided by the following question: how can human-AI collaboration mediated by GAIA grounded in specialised knowledge support the agile generation of proto-personas within the context of data-driven marketing?

2 Literature Review

The use of buyer personas and proto-personas in marketing has been discussed as a practice aimed at understanding consumers and achieving strategic alignment of teams, products and markets. While buyer personas require consolidated databases, proto-personas emerge as preliminary representations constructed from the empirical knowledge of specialist – i.e., the externalisation of their tacit knowledge (Cooper, 2004; Nonaka and Toyama, 2021; Pinheiro et al., 2018; Trauer and Valdati, 2023; Trauer and Valdati, 2024; Trauer and Valdati, 2025). This approach proves particularly relevant in niche markets where structured data are scarce, and knowledge resides predominantly in the accumulated experience of actors in the sector. In these contexts, the construction of proto-personas assumes an exploratory and iterative character, enabling the externalisation of implicit knowledge and the initial formulation of patterns of consumer behaviour, motivations and needs, as reported in previous research on knowledge-creation and use in organisations (Davenport and Prusak, 1998).

Advances in the field of GAI and Large Language Models (LLMs) have broadened the debate on the role of these technologies as mediators in complex cognitive processes. Unlike traditional decision-support systems, GAIA is capable of synthesising information from multiple sources, structuring narratives and supporting interpretive processes in direct interaction with human users. Indeed, AI agents and generative AI have been shown to be at the peak of the hype cycle, exhibiting strong momentum in the current market (den Hamer et al., 2025; Gartner, 2024; Mora-López et al., 2026). These systems may function as cognitive partners, particularly when supplied with specialised and contextualised knowledge bases (Trauer and Valdati, 2024; Trauer and Valdati, 2025). In the field of marketing, this human-AI collaboration has been associated with the expansion of analytical capacity, the acceleration of exploratory processes, and the strengthening of empathy in the understanding of specialist markets, reinforcing human-centred relational approaches as presented by H2H paradigm (Kotler et al., 2024).

In the context of education and data-driven marketing, agile methodologies have gained prominence as particularly well-suited to addressing problems, characterised by uncertainty, complexity, and constraints of time and resources. The literature suggests that short cycles of experimentation, incremental learning and continuous validation are especially effective in the construction of exploratory artefacts such as proto-personas (Cooper, 2004; Trauer and Valdati, 2024). The integration of agile methodologies with GAIA enhances this process by enabling the rapid incorporation of specialised knowledge, the iterative reformulation of hypotheses, and the reduction of costs associated with traditional qualitative data collection. As such, collaboration between humans and GAIA, underpinned by knowledge bases derived from human experts, constitutes a promising approach to the co-creation of market knowledge in niche markets, thereby contributing to consistent, efficient and contextualised decision-making.

The transition from conventional GAI to agent-based architecture represents a fundamental evolution, moving from systems that merely respond to commands towards proactive computational entities. The following section develops this theoretical framework with a focus on the integration of RAG-type (Retrieval-Augmented Generation) agents.

2.1 The nature of generative AI agents

GAI differs from traditional algorithms in that it operates in a probabilistic and non-deterministic manner. Whereas an algorithm follows rigid coding steps to transform an input into an output, GAI employs neural networks trained on vast datasets to identify patterns and generate new content (Dar and Gul, 2025).

When this generative capacity is encapsulated in the form of an AI agent, the system acquires autonomy. Historically, AI research has focused on the development of rational agents that act to achieve the best expected outcome in the face of uncertainty (Russell et al., 2021). Currently, an AI agent is defined as an autonomous or semi-autonomous software entity that employs AI techniques to perceive its environment, make decisions, execute actions and attain goals.

These authors differentiate the terminology along a spectrum of autonomy as follows:

- AI assistants: modules that assist with tasks under the direct request and guidance of a human user;
- AI agents: entities that operate independently, extending beyond simple responses to prompts by assuming control of planning and execution to achieve objectives; and
- Agentic AI: a broader approach to building solutions based on one or more collaborative AI agents.

2.1.1 Core architecture and agentic capabilities

Unlike a standalone LLM, an agent combines the LLM with peripheral components in order to act (Taurion, 2026). The anatomy of an AI agent is structured around six core capabilities: perception, decision-making, actioning, agency, adaptability and knowledge (den Hamer et al., 2025).

LLMs function as the central cognitive engine for interpretation and decision-making, and their architecture comprises:

- Memory: essential for maintaining the context of ongoing tasks and retaining the history of interactions (Taurion, 2026);
- Orchestration layer (planning): controls the execution flow, frequently operating in continuous loops (primary execution loops, secondary adaptation loops, and tertiary control/planning loops) (den Hamer et al., 2025); and
- Tools and connectors: interfaces that enable the agent to interact with the real world, query APIs, analyse documents and retrieve information from external databases (Taurion, 2026).

2.1.2 RAG-Based agents (Retrieval-Augmented Generation)

Among the greatest challenges for the adoption of LLMs in corporate and business environments are the phenomenon of hallucination (the fabrication of data) (Kalai et al., 2025; OpenAi, 2025; Swain, 2025; Xing, 2025), and the lack of transparency (the so-called *black box* problem) in the decision-making process of models. To mitigate these risks and ensure that the agent's knowledge is factual, up to date and domain-specific risks and ensure that the agent's knowledge is factual, up to date and domain-specific, RAG-type agent architecture may be employed (Acatrinei, 2025; Wang et al., 2026).

RAG architecture functions by anchoring the agent's responses in domain-specific knowledge bases, rather than relying solely on the model's parametric (trained) knowledge, thereby mitigating hallucinations and improving reliability in decision-making workflows (Wang et al., 2026). According to Wang et al. (2026), the structure of a knowledge management focused agent employing RAG functions as presented in Figure 1:

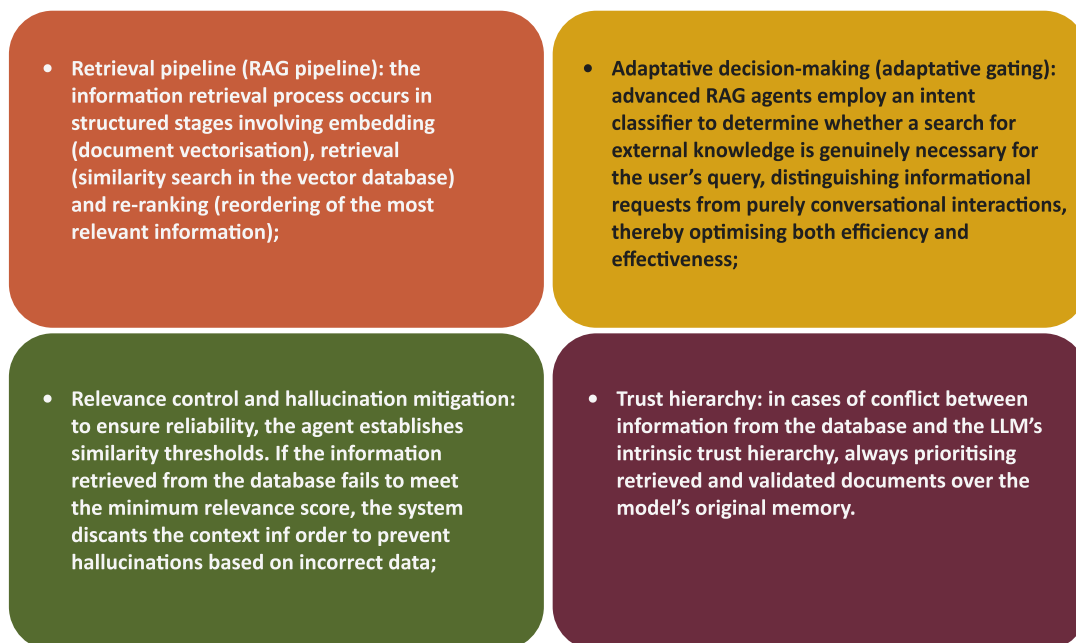


Figure 1- RAG-Based agents (Retrieval-Augmented Generation) (Wang et al., 2026)

In the context of marketing and proto-persona ideation, the RAG agent does not operate by generating creative text from nothing but instead retrieves factual data on consumer behaviour, guidelines provided, and reports from the database supplied to it, and subsequently employs the LLM to analyse and synthesise this information. This ensures that human-AI co-creation is simultaneously innovative and grounded in the empirical reality of the market, drawing on the interviews conducted and provided to GAIA (Acatrinei, 2025; Wang et al., 2026).

2.2 Human-AI collaboration in the construction of proto-personas

Proto-personas are semi-fictional representations of ideal customers, conceived on the basis of tacit knowledge and the insights shared by specialists (Trauer and Valdati, 2023; Trauer and Valdati, 2024; Trauer and Valdati, 2025). They offer an agile and low-cost approach to strategic alignment, hypothesis formulation, and

consumer-centred decision-making, enabling rapid actions while more robust market data are collected and validated.

The incorporation of GAIA into this process acts as a cognitive catalyst. Rather than functioning as a passive tool, the AI operates as a cognitive mediator and empathic interlocutor, facilitating the externalisation of practitioners' knowledge and its internalisation by undergraduate students. The successful construction of these proto-personas occurs through the advantageous integration of the stages of the knowledge creation model proposed by (Nonaka and Takeuchi, 1995; Nonaka and Toyama, 2021): Externalisation – produced during the researcher's interviews with sector specialists; Internalisation – during the students interviews process with J. J. Naka; Socialisation once again – arising from reports produced by students. Socialisation also occurs when students present their findings orally in seminars.

This collaborative dynamic reflects the principles of H2H marketing (Kotler et al., 2024), ensuring that, despite algorithmic mediation, the process retains authenticity and remains centred on the real and psychological needs of individuals. The interactive interaction with AI provides a safe environment, available around the clock, for testing, simulating real market conditions, and deepening target audience segmentation.

2.3 Challenges, ethics and corporate governance

Agent-mediated co-creation shows considerable promise. However, it presents significant practical and ethical challenges. The increasing autonomy of AI calls for careful attention to reliability and security (Taurion, 2026). Language models may make interpretive errors or fabricate plausible yet incorrect facts, giving rise to a phenomenon known as hallucination (Dar and Gul, 2025; Kalai et al., 2025; OpenAi, 2025; Swain, 2025; Taurion, 2026; Xing, 2025). Furthermore, because of their inherent complexity, deep learning algorithms frequently operate as a black box and therefore undermine transparency in decision-making (Dar and Gul, 2025).

Excessive delegation of critical thinking and creativity to AI may lead to dependence on technology, compromising the problem-solving abilities of the humans involved. The security of corporate data is equally critical, as agents that interact with and retrieve information from real databases and APIs are vulnerable to attacks such as *prompt injection*, which may force them to leak sensitive data or make unintended decisions (Dar and Gul, 2025; Taurion, 2026).

Implementing these corporate architectures requires more than mere technological adoption – it requires rigorous governance. It is essential to establish clear boundaries for AI operation, to maintain human supervision and validation at critical stages, to ensure continuous monitoring and to enforce stringent data protection policies. With appropriate regulation and oversight, GAIAs may serve as secure and scalable partners in the generation of insights and market intelligence.

3 Methodology

This study adopts an applied qualitative approach with an exploratory-descriptive design, grounded in the KM 5.0 paradigm. This emphasises the integration of advanced technologies with human-centred knowledge processes (Keidanren, 2018; Nonaka and Takeuchi, 1995; Nonaka and Toyama, 2021). The research was conducted within the Digital Marketing Environments and Data-Driven Marketing modules at ESAG/Udesc during the 2025-2 semester, incorporating a GAIA developed via ChatGPT. The agent named J. J. Naka, was designed to function as a cognitive mediator in knowledge co-creation processes, supporting the development of proto-personas in an educational context.

The target population that has participated in the final evaluation survey comprised 71 students enrolled in the 2025-2 semester, of whom 67 participated effectively, yielding a response rate of 94.4%. Participants included both Brazilian students and European exchange students, representing a heterogenous learning environment. Students conducted individual interviews with GAIA in either Portuguese and English and recorded the responses for subsequent systematisation. Employing a methodological framework previously introduced in the classroom, students organised themselves into groups to develop proto-personas representative of consumer segments within the Brazilian bonsai market. These proto-personas were constructed through the integration of tacit knowledge from real market specialists – externalised to form J. J. Naka knowledge base – together with secondary data, following the conceptualisation proposed by (Trauer and Valdatti, 2024). Variables such as demographic profile, motivations, objectives, challenges and information sources were considered.

The methodological approach was based on the SECI model of knowledge creation – Socialisation, Externalisation, Combination and Internalisation – originally proposed by (Nonaka and Takeuchi, 1995).

Data collection was carried out by means of a structured questionnaire comprising both closed-ended items (Likert scale) and open-ended questions. This enabled the assessment of variables such as the clarity of the agent's responses, its contribution to understanding consumer behaviour, the perception of the agent as a

cognitive partner, and the intention of use AI in the future. The findings indicate that integration of generative AI with active pedagogical strategies enhances the development of proto-personas as both a learning tool and strategic marketing resource in niche markets. Furthermore, the results reinforce the relevance of KM 5.0 principles and H2H marketing (Kotler et al., 2024), emphasising the role of AI as a facilitator in the co-creation of knowledge without compromising human centrality in the learning process.

4 Results

The response adherence rate in this survey was 94.4%, derived from 67 valid responses. This figure approaches census-level coverage. Amongst the principal findings, the following merit particular attention:

- Quantitative efficacy and technological acceptance: data measured by Likert scale attest to a high level of acceptance and perceived pedagogical utility of the technology. Notably, 98.5% of participants recognised J. J. Naka as an effective mediator, perceiving the system not as a mere search engine but as an active partner in knowledge construction and a facilitator for the generation of detailed consumer insights. In addition, the agent's communicative capacity received a score of 4.19 out of 5 on the response clarity criterion. Satisfaction levels culminated in a strong behavioural intention, with the agent achieving a recommendability score of 8.57 out of 10.
- Qualitative foundations of successful co-creation: analysis of the open-ended questions and students' perceptions revealed that the efficacy of proto-persona construction rested upon three analytical pillars:
 - Cognitive mediation: J. J. Naka as a cognitive catalyst, facilitating the process of knowledge externalisation by students. This mediation promoted higher level strategic reflection on consumer behaviour within the Brazilian bonsai niche market, and resulted in more sophisticated and segmented market analyses;
 - Empathy and humanisation (H2H marketing): corroborating the theoretical framework of human-centred relational marketing, participants attributed markedly anthropomorphic characteristics to the system. The agent was described as practical and direct, instructive and attentive as well as empathic and trustworthy. This personification of technology proved fundamental in establishing trust and enabling authentic dialogue, both essential to the co-creation dynamic;
 - Epistemological integration: the collaboration enabled the advantageous integration of a technical and informational knowledge (supplied and structured by the AI) with tacit knowledge (inferred and produced by the student). This ensured the generation of proto-personas that were both market coherent and contextually aligned.
- Educational impact and practical skills development: in the context of the teaching and learning process, AI mediation strengthened active methodologies by creating a safe readily available environment for experimentation. Students were able to iterate, test hypotheses and refine their interpretations of proto-personas through continuous feedback cycles. Consequently, the development of practical skills for transforming abstract theories into actionable insights was observed simulation real market conditions and enhancing data-driven analytical capabilities. The motivational impact was also considerable, with multiple students reporting their intention to incorporate such agents as strategic allies both in their professional lives and in future projects.

These experiment findings reinforce the premise that GAIAs can function effectively as empathic interlocutors and co-creators of value, enabling pedagogical innovation and knowledge management practices in specialised niche markets.

4.1 Contributions to academia

In the academic and educational context, the construction of proto-personas supported by GAIA represents a significant technological and pedagogical innovation. This integration contributes to learning in several noteworthy ways:

- Fostering active methodologies and safe experimentation: GAIA-mediated interaction provides a safe environment for experimentation where students may test hypotheses about consumer profiles and iteratively refine their interpretations on a continuous basis;
- Development of practical skills and critical thinking: the use of these technologies helps students to transform abstract theory into actionable insights. By simulating real market conditions in the creation of proto-personas, students develop data-driven analytical capabilities and sharpen their critical thinking skills;

- Experiential and applied learning: for higher educational institutions, the systematic adoption of AI agents as pedagogical mediators in field work activities, interdisciplinary projects or market simulations directly promotes high-impact experiential applied learning;
- Cognitive partnership in knowledge co-creation: AI agents function as cognitive partners and empathic interlocutors, actively assisting in the construction and structuring of the knowledge required to design proto-personas;
- Increased motivation and professional development: the use of AI in the classroom tends to significantly increase student engagement and motivation in future projects. The practice actively prepares future professionals, particularly in marketing, by cultivating a culture of co-creation and innovation while maintaining human centrality and autonomy in the learning process.

4.2 Contributions to the market

Beyond the educational environment, proto-personas are employed as provisional, semi-fictional representations of ideal customers. They are constructed from the tacit knowledge and shared insights of specialist teams. Originally conceived in the software industry as a low-cost, rapid-implementation alternative (Pinheiro et al., 2018), they are being adapted to the marketing environment as a means of generating tactical and strategic marketing actions (Trauer and Valdati, 2023).

Their practical application in the corporate and business world is most prominent in the following areas:

- Strategic alignment and decision-making: proto-personas provide an agile approach to aligning teams, jointly formulating hypotheses about customers and guiding strategic decisions. They offer an immediate, consumer-centred perspective whilst more robust and detailed market data are collected for future validation;
- Competitive advantage in marketing: for marketing professionals, the construction of proto-personas, particularly when optimised through GAIA, serves as tactical tool for cost reduction and increased strategic response speed. They are especially useful in the initial exploration of as yet unstructured market segments and consumption niches that demand a high degree of customisation, and
- Multidisciplinary adoption: the logic of proto-personas of the detailed understanding of users' needs may be extended beyond technology and marketing, to sectors such as design, business administration, humane-centred smart cities, and healthcare.

Figure 2 presents an adaptation of the SECI model of knowledge creation proposed by Nonaka and Takeuchi (1995) and Nonaka and Toyama (2021), applied to the context of proto-persona development supported by GAIA – here referred to as J. J. Naka. The model retains the classical structure of the four knowledge conversion modes – Socialisation, Externalisation, Combination and Internalisation. It incorporates empirical elements from this research process, highlighting technological mediation as an integral component of the knowledge creation dynamic. At the centre of Figure 2, agent Naka functions as an articulating element, connecting the different phases of the process and enhancing the transformation and circulation of knowledge amongst participants.

In the Socialisation quadrant, the origin of tacit knowledge is identified through in-depth interviews with bonsai market specialists, as well as the continuation of this process in student interactions and group discussions. The inclusion of seminar presentations within this quadrant reinforces the notion that the exchange of experiences, perceptions and interpretations between students and the lecturer constitutes a moment of shared tacit knowledge generation.

In the Externalisation quadrant, this knowledge becomes explicit through the recording and transcription of interviews, and the incorporation of secondary sources such as books and technical reports that feed into the GAIA's knowledge base. This process illustrates the structured transformation of tacit knowledge into communicable and reusable artefacts.

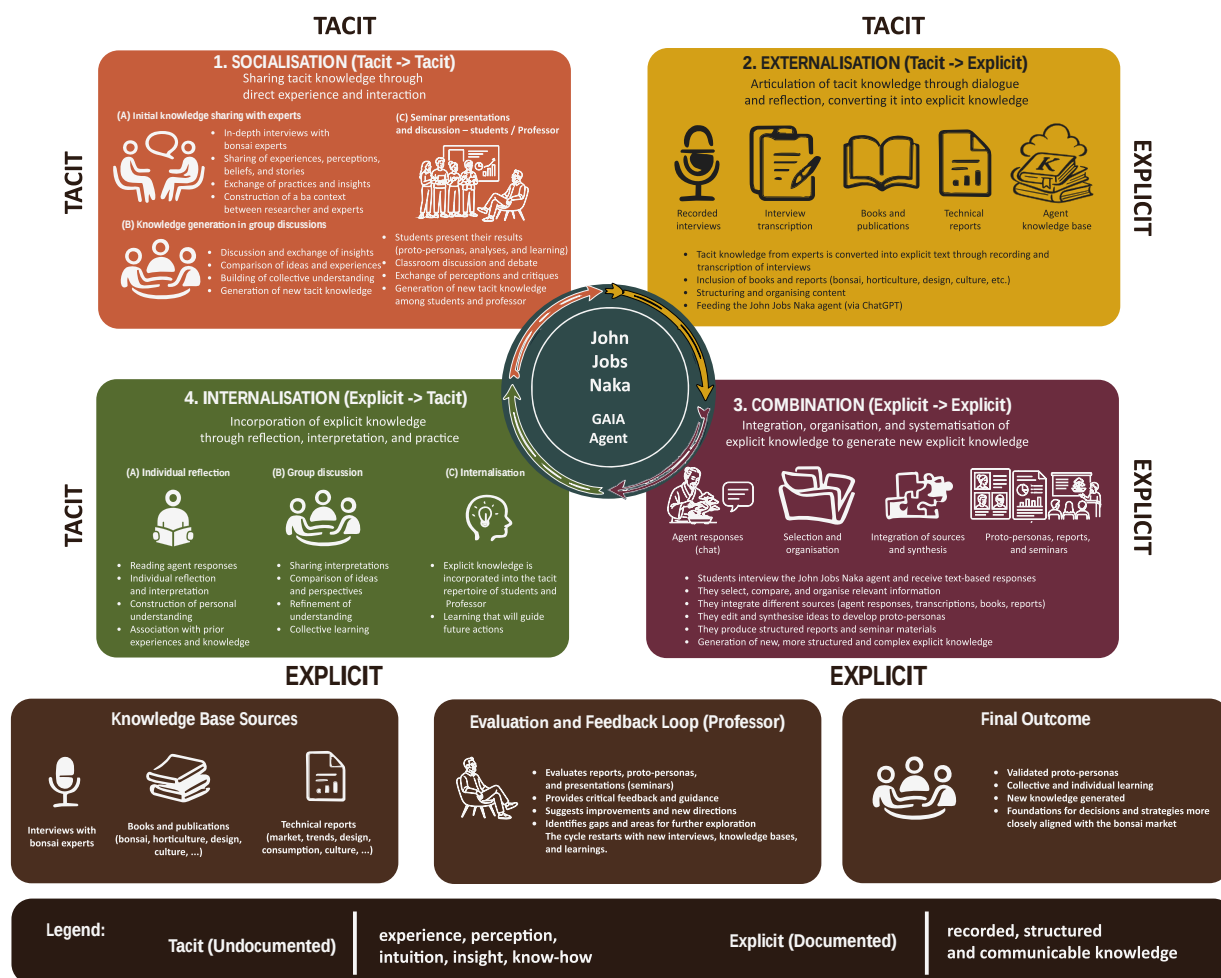


Figure 2 - Knowledge Creation Model - Proto-Personas with GAIA adapted by Nonaka and Toyama (2021)

In the lower quadrants, Figure 2 makes explicit an analytical distinction between Combination and Internalisation. Combination is represented by the activities of organising, selecting, integrating and synthesising explicit content. These are carried out by students on the basis of the agent's responses and other sources, and generate proto-personas, reports and presentation materials. Internalisation occurs when students individually read, reflect upon and interpret this information, incorporating it into their tacit repertoire - a process that extends to group discussions and the learning arising from participating in seminars. Finally, the assessment conducted by the lecturer serves as a feedback mechanism for the system, which contributes to the continuous refinement of knowledge and reinforces the spiral nature of the model, consistent with the dynamic perspective of organisational knowledge creation.

4 Limitations

The configuration of the John Jobs Naka agent via ChatGPT presented specific structural characteristics and limitations during its application.

- Closed knowledge base: the agent was configured with a restricted corpus (knowledge base), which may limit the exploration of content extending beyond the specific scope of bonsai;
- Absence of cross-session memory: the system employed does not retain memory of interactions across different sessions, which restricts the capacity for medium- and long-term longitudinal knowledge construction;
- Lack of external validation: the project did not include external validation by bonsai segment specialists to confirm the accuracy and level of expertise of the domain information; and
- Refinement limitations: time constraints during the academic semester means there were limited opportunities to refine configuration prompts, test new iterations or incorporate student feedback with a view to improving the agent's responses.

5 Conclusion

This study demonstrates that human-AI collaboration mediated by GAIA and underpinned by specialist expertise may function as an efficient and effective mechanism of co-creation within a data-driven marketing context. It may enable the agile generation of proto-personas in niche markets characterised by a scarcity of structured and secondary data. From the perspective of the SECI model, the findings indicate that the GAI agent may operate as a cognitive mediator, enhancing the processes of externalisation, combination, and internalisation of knowledge, without displacing the centrality of human interpretation.

Empirically, the interaction between students and the agent J. J. Naka facilitated the development of coherent and contextually-grounded artefacts without the need for physical travel or scheduling consultations with human experts. The process enabled the integration of specialised tacit knowledge and explicit information through continuous cycles of refinement. This dynamic supports the notion that GAI agents, when anchored in refined knowledge bases, can expand analytical capacity and reduce divergences in the exploration of niche markets.

As a contribution, the study integrates KM 5.0 with agent-based generative AI architectures, highlighting their applicability in the construction of marketing knowledge - particularly proto-personas - and in supporting active learning methodologies. From a methodological standpoint, it demonstrates the feasibility of employing a GAIA as a structuring instrument for the generation of exploratory artefacts. In practical terms, the findings point to the potential for accelerating analytical and decision-making processes in contexts characterised by high complexity and limited data availability.

The limitations identified indicate the need for external validation, expansion of the knowledge corpus, and application across different contexts, thereby opening avenues for future research into the robustness and scalability of human-AI co-creation.

6 Ethic declaration

The author declares that the research described in this study involved human participants in an educational context, characterising it as a low-risk activity. Student participation was voluntary, and the data collected were treated anonymously and confidentially, with no identification of participants at any stage.

In accordance with institutional guidelines and the nature of the study, submission to a Research Ethics Committee was not required. The study upheld the ethical principles applicable to research involving human participants, including confidentiality, voluntariness and the responsible use of data.

7 AI declaration

The author declares that GAI tools were employed in a limited and controlled manner during the development of this study. Specifically, AI was used to support the initial development of Figure 1, inspired by the SECI model proposed by Nonaka and Takeuchi (1995) and Nonaka and Toyama (2021).

The AI tool was employed in the visual structuring and preliminary layout of this figure, including suggestions regarding spatial organisation, graphic elements and visual hierarchy. The material generated was used exclusively as a draft for conceptual visualisation. Figure 1 was subsequently refined by the author using Adobe Illustrator software.

All subsequent stages - including the refinement of the model, theoretical alignment, adaptation to the empirical context, and the final version of Figure 1 - were developed, critically evaluated and validated in their entirety by the author, thereby reflecting the author's intellectual contribution and theoretical interpretation.

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