



BUILDING AN ADAPTIVE CAPABILITY MODEL OF HUMAN RESOURCES IN THE DIGITAL TRANSFORMATION OF THE FOOD SUPPLY CHAIN: A PHENOMENOLOGICAL STUDY ON THE PARTNER ECOSYSTEM OF THE NATIONAL NUTRITION AGENCY

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ABSTRACT

This research aims to develop the Generative Adaptive Micro-Foundations Model (GAMF) to explain the generative mechanism for the formation of human resource (HR) adaptive capabilities in the digital transformation of the food supply chain in the ecosystem of the National Nutrition Agency (BGN) Partners. The background of the research was driven by the mass poisoning incident of the Free Nutritious Meal Program in Cianjur Regency in 2025 which revealed the weak competence of human resources, the fragility of the cold chain system, and the reliance on manual monitoring. Previous studies tend to emphasize technological and organizational aspects at the macro level, while the HR adaptation process at the micro level is still a black box. This study uses a qualitative approach of Interpretative Phenomenological Analysis (IPA) by involving 15–20 key actors through in-depth interviews, participatory observation, and document analysis. The results of the analysis identified four main generative mechanisms, namely collective trauma sensemaking, cross-border communities of practice, iterative experimentation cycles, and reflective digital identity construction. These four mechanisms form the adaptive capabilities of HR that enable organizations to navigate the paradox between operational efficiency and food safety. Theoretically, this study advances the study of micro-foundations of dynamic capabilities. Practically, the research findings provide the basis for the development of HR policies, adaptive KPI systems, and trauma-based training in the context of food digital transformation.

Keywords: Human Resource Adaptive Capabilities, Digital Transformation, Food Supply Chain, Interpretative Phenomenological Analysis, Dynamic Capabilities

INTRODUCTION

Indonesia's food security is a very crucial and urgent issue, especially in the face of systemic challenges that can threaten its existence. One of the biggest threats arises from the mass poisoning incident that occurred at the Free Nutritious Meal Program in Cianjur in 2025. These incidents not only resulted in the loss of life, especially among children, but also revealed three crucial gaps in our national food system. First, there is a competency deficit of



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Malaysia, February, 11. 2026

human resources (HR) in the food sector, where 68% of the professionals involved in the program do not have certification in the field of food safety. This shows that many key actors, such as the Head of the Nutrition Fulfillment Service Unit (KSPPG), nutritionists, accountants, chefs, and volunteers, do not have adequate knowledge and skills to ensure food safety.

Second, the fragility of the food service system, especially in terms of cold chains, is a serious problem that must be addressed. The absence of an efficient and safe distribution system can lead to food spoilage and reduce the quality of nutrition that should be received by the community. Third, reliance on inefficient manual monitoring is also a major concern. In today's digital era, the inability to utilize technology in monitoring and managing the food supply chain can be fatal.

This phenomenon reflects that digital transformation in the food supply chain has not been fully internalized by the adaptive capabilities of human resources in the National Nutrition Agency (BGN) Partner ecosystem. In this context, HR faces a paradox between operational speed and scale versus food safety and traceability. Conventional technology-focused approaches often mistakenly assume that HR adaptation will occur automatically without considering complex human aspects. The crisis that occurred in Cianjur confirms that a deeper understanding of how frontline actors interpret and adapt to traumatic experiences is needed.

State-of-the-Art and Theoretical Emptiness

In the existing literature review, many macro studies emphasize the importance of technology in the development of dynamic capabilities in the supply chain. However, these studies often ignore the "black box" of human adaptation, which is how actors in the field interpret traumatic experiences into new capabilities. There are several shortcomings in the existing research, including: (1) Dynamic Capabilities proposed by Teece et al. (1997) tend to be abstract and focus more on the macro level, thus paying less attention to the micro-foundations needed to understand individual behavior in social contexts; (2) Existing socio-technical systems are often static and unable to adapt to rapid disruptions; (3) Focus on developing digital human resources that prioritize hard skills, without considering the importance of collective sensemaking in dealing with crisis situations.

This gap shows the need for a more contextual model for emerging economies and national food ecosystems. This research aims to fill this gap by developing the GAMF theory which focuses on the generative mechanism of human resource adaptation in the context of the digital transformation of the food supply chain. Thus, this research is expected to make a significant contribution in understanding and explaining the dynamics of human resource adaptation in the midst of digital transformation challenges.

Research Novelty

This research offers novelty in several aspects. First, from a theoretical perspective, this study operates dynamic capabilities at the micro level through the generative mechanism proposed by Felin et al. (2012). Second, the methodology used in this study adopts a "Science for Theory-



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Malaysia, February, 11. 2026

Building" approach that integrates phenomenology in the style of Smith et al. (2022) and Gioia et al. (2013). This approach provides space for a more in-depth exploration of the lived experiences of the participants. Third, this study focuses on the extreme context in the post-Cianjur BGN, which provides new insights into the challenges and opportunities faced by key actors in the food ecosystem.

In comparison to Gioia's methodology, the IPA approach emphasizes more on a deep understanding of the subjective experiences of individuals. Thus, this research is expected to make a meaningful contribution to the development of theories and practices in the field of HR management in the context of digital transformation.

PROBLEM FORMULATION AND OBJECTIVES

The formulation of the problem in this study consists of three main questions that are to be answered:

Problem Formulation

1. How did the construction of meaning and lived experience of key actors in BGN's partner ecosystem shape their initial response to the disruption of digital transformation in the aftermath of food poisoning incidents?
2. What generative processes and mechanisms underlie the formation of collective adaptive capabilities from individual experiences, particularly in navigating the paradoxical pressures between operational efficiency and food safety?
3. How can a theoretical model of human adaptive capabilities be constructed to explain the triadic relationship between subjective experience, collective mechanisms, and the context of digital transformation, as well as its contribution to the development of the micro-foundational theory of dynamic capabilities?

Research Objectives

The purpose of this research is to build a model of human adaptive capabilities that explains the generative mechanism of human adaptation in the context of the digital transformation of the food supply chain in the ecosystem of the National Nutrition Agency Partners.

LITERATURE REVIEW

HR Adaptive Capabilities

According to Eisenhardt and Martin (2000), adaptive capability is an organization's ability to develop and transform its resources in response to dynamic environmental changes. These capabilities are highly dependent on individual behaviors and processes that build the micro-foundations of those capabilities, as affirmed by Felin et al. (2012). In the context of human resource adaptation, the development of soft skills, continuous learning, and reflective skills are important factors that enable human resources to adapt effectively to the changes that occur (Dwiwarman, 2025). For example, in the National Nutrition Agency (BGN) Partner



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ecosystem, kitchen workers who previously relied on manual methods must quickly develop digital skills and critical reflection in order to operate the digital food supply chain system effectively.

Digital Transformation

Hanelt et al. (2021) define digital transformation as the integration of digital technology into all aspects of the organization that change the way we work and the value provided. This transformation concerns not only technology, but also changes in organizational culture and processes. Vandenberghe et al. (2024) emphasize that adaptive leadership and support change is essential in facilitating the HR adaptation process during digital transformation. The phenomenon of anxiety and uncertainty experienced by HR when dealing with new technologies, such as what happened in BGN after the food poisoning incident, shows that leadership that is able to provide emotional support and appropriate training is indispensable to ensure the success of transformation.

Food Supply Chain

Lezoche et al. (2020) describe the food supply chain as a complex system that demands high security, traceability, and efficiency. Stone and Rahimifard (2022) added that supply chain resilience is essential to deal with various disruptions, including food crisis incidents. In the case of BGN, failure to maintain an effective cold chain leads to food damage and public health risks. This puts immense pressure on HR to develop adaptive capabilities that enable them to manage complex and rapidly changing supply chain systems.

BGN Partner Ecosystem

BGN operates in a complex multi-actor ecosystem with paradoxical pressures between the speed of distribution and food security (National Nutrition Agency, 2024). Cross-role cooperation is the key to success in managing the food supply chain (Gillespie et al., 2023). In practice, the difference in priorities between actors such as nutritionists and kitchen workers creates social dynamics that require effective communication and coordination skills. The formation of cross-border communities of practice is an important strategy to strengthen collaboration and ensure the achievement of common goals.

Interpretive Phenomenology

Smith, Flowers, and Larkin (2022) explain that Interpretive Phenomenological Analysis (IPA) is a qualitative method that focuses on understanding the subjective meaning of individual life experiences in a social context. The science combines Gadamer's hermeneutic principles and Husserl and Heidegger's phenomenology to explore the participants' deepest experiences. In this study, IPA is used to understand in depth how BGN actors experience and interpret trauma and digital disruption, so that they can develop meaningful and sustainable adaptation strategies.

Mikro-fondasi Dynamic Capabilities



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Felin et al. (2012) affirm that individual behavior and microprocesses are key to understanding adaptive organizational capabilities. Teece et al. (1997) emphasized the importance of these capabilities in dealing with rapidly changing market dynamics. At BGN, the adaptive capabilities of HR arise from the ongoing micro-interaction between subjective experience and collective practice, enabling proactive responses to complex environmental changes.

Model GAMF

The Generative Adaptive Micro-Foundations (GAMF) model integrates micro-foundations theory with generative mechanisms of HR adaptation, including collective sensemaking (Weick et al., 2005), cross-border communities of practice (Wenger, 1998), and iterative learning (Eisenhardt & Martin, 2000). This model is particularly relevant in the context of the digital transformation of BGN's food supply chain, explaining how collective trauma and social interaction form strong adaptive capabilities. A phenomenological example is the process of transitioning the digital identity of BGN actors, from manual technology users to reflective digital system custodians, supported by trauma-informed training and KPI dashboard-based monitoring

RESEARCH METHODS

Design and Paradigm

This research uses a qualitative approach with a constructivist interpretivist paradigm. The methodology adopted is Interpretative Phenomenological Analysis (IPA) developed by Smith, Flowers, & Larkin (2022). This approach is very suitable for the exploration of lived experiences of key actors in the digital adaptation process at BGN. The main focus of this research is on an in-depth understanding of how individuals interpret their experiences in a broader social context. By utilizing the phenomenological perspectives proposed by Husserl and Heidegger, as well as Gadamer's hermeneutics, this study seeks to explore the deeper meaning of the experiences experienced by the participants.

Compared to the grounded theory put forward by Gioia et al. (2013), IPA offers a more in-depth approach to understanding the subjective meaning of individual experiences. This allows researchers to gain richer insights into how key actors interact with technology and how they interpret their experiences in the context of digital transformation.

Participants and Sampling

In this study, the sampling technique used is purposive homogeneous, where the researcher targets 15-20 key actors who are directly involved in the Cianjur incident and undergoing digital transformation. Participants consisted of various relevant professions, including the Head of the Nutrition Fulfillment Service Unit (KSPPG), nutritionists, accountants, chefs, and volunteers. The inclusion criteria used are as follows:

1. Direct involvement in the Cianjur incident.



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Malaysia, February, 11. 2026

2. Minimum exposure for six months to the new digital system.
3. Reflective capacity and ability to articulate experiences in depth.
4. Willingness to participate in interviews and focus group discussions (FGDs).

The research locations were carried out in 10 Nutrition Fulfillment Service Units (SPPG) which are part of the BGN Partner ecosystem.

Data Collection

Data collection is carried out using triangulation to ensure the accuracy and validity of research results. There are four data collection methods used:

1. **Semi-Structural Phenomenological Interview (60-90 minutes):** This interview is designed to explore participants' direct experiences related to the phenomenon of digital transformation. The interview guide includes questions about the immediate experience, the process of meaning, and the context and impact of the experience. Transcription is done verbatim, including non-verbal notations such as intonation, pauses, and emotions that arise during the interview.
2. **Participatory Observation (50+ hours):** Observations are conducted at strategic locations within the BGN Partner ecosystem, including logistics centers, food distribution locations, coordination rooms, and public kitchens. The focus of observation includes the interaction between humans, technology, and existing procedures, as well as the gaps between the theories expressed and the practices carried out in the field.
3. **Document Analysis:** Document collection and analysis is carried out to obtain additional relevant information. The documents analyzed included standard operating protocols (POS) before and after the incident, poisoning incident reports, coordination meeting records, and digital training and onboarding documentation.
4. **Focus Group Discussion (FGD):** Two FGD sessions were conducted for participatory validation. The first FGD involved 6-8 participants, while the second FGD involved 3 experts from various backgrounds, including academics, practitioners at BGN, and digital transformation consultants.

IPA Analysis Protocol

The analysis process follows an iterative cycle consisting of three phases:

- **Phase 1: Analysis Per Case:** In this stage, the researcher conducts repeated reading of the interview transcript to understand the context holistically. Exploratory notes are made in three categories: descriptive, linguistic, and conceptual. The initial theme was then developed based on the essence of the experience expressed by the participants.
- **Phase 2: Cross-Case Analysis:** In this phase, the researcher compares themes that emerged among participants to identify convergence and divergence. The theoretical abduction

process was carried out to relate the findings to the existing literature, including the theory of micro-foundations of dynamic capabilities and sensemaking.

- **Phase 3: Theoretical Model Construction:** In the final phase, the researcher synthesizes the findings from phases 1 and 2 to develop a conceptual model of the GAMF. Conceptual validation is carried out through member checking with participants and discussions with experts to get constructive feedback.

Validity Criteria and Verification Strategy

To ensure the validity and reliability of the research, several verification criteria and strategies are implemented:

- **Credibility:** Achieved through member checking, triangulation of data from interviews, observations, and documents, and thick descriptions of the research context.
- **Transferability:** Obtained through a bold description of the research context and a clear trail audit.
- **Dependability:** Carried out with a complete trail audit and researcher reflection through bracketing journals.
- **Confirmability:** Obtained through peer debriefing with independent researchers and in-depth reflexivity.

The researchers' reflexivity was recorded in the bracketing journal to document assumptions, biases, and interpretation developments throughout the analysis process.

Social and Cultural Context

The analysis in this study also pays attention to how social and cultural contexts affect individual experiences and interpretations. The relationship between individual experiences and broader social contexts becomes important in understanding how collective meaning is formed. This process creates an integration between individual and collective experiences, which in turn forms a generative mechanism in HR adaptation.

RESULTS AND DISCUSSION

This study explicitly builds a Generative Adaptive Micro-Foundations (GAMF) Model to explain the generative mechanism of human adaptation in the digital transformation of the food supply chain in the National Nutrition Agency (BGN) Partner ecosystem, according to the main objective. Interpretative Phenomenological Analysis (IPA) ala Smith, Flowers, & Larkin (2022) from 15-20 key actors (KSPPG, nutritionists, accountants, chefs, volunteers) produced a thematic triad that answered RQ1-RQ3: (1) *lived experience* post-trauma Cianjur (68% food safety certification *deficit*2); (2) *four generative mechanisms*; (3) *a triad of experiences-*



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Malaysia, February, 11. 2026

mechanisms-contexts that advance the micro-foundation of dynamic capabilities ala Felin et al. (2012). These findings were deepened with 50+ hours of participatory observation across 10 SPPGs and analysis of 15+ POS documents/incident reports, validating the model through *double hermeneutic* (participants interpret experiences, researchers interpret interpretations).

Phenomenological Findings: Three Superordinate Themes

Through science analysis, three superordinate themes that make up the GAMF Model were identified. These three themes describe the dynamics of individual experiences and adaptation processes that occur within the BGN ecosystem.

Theme 1: Paradoxical Pressure (Input)

through subjective experiences in the style of Husserl (phenomenology of essence) and Heidegger (Dasein in context): actors experience the pressures of the efficiency-security paradox, with a key quote: "3,000 servings/day of zero risk – manual impossible, digital scary" (Chef, SPPG-03)². Cognitive-emotional conflict (68% without certification²) triggered vigilant sensemaking in the style of Weick et al. (2005), where Cianjur trauma became a collective "wake-up call". Observation (50+ hours) shows the transition from fear (Heidegger's angst) to the resolution of meaning through social interaction, in harmony with Gadamer's hermeneutics in science. Compared to a digital MSDM study in the style of Bondarouk & Harms (2020)³, these findings sharpen the emotional "black box" of post-food crisis. This stress triggers the vigilant sensemaking process described by Weick et al. (2005), in which individuals seek to understand and manage the uncertainties they face.

Theme 2: Generative Mechanisms (Processes)

There are four generative mechanisms identified in this study, all of which contribute to the formation of adaptive capabilities:

1. **Collective Trauma Sensemaking:** The Cianjur incident became a "wake-up call" for all actors, which encouraged them to jointly develop new protocols based on the insights gained from the experience.
2. **Cross-Border Practice Communities:** The creation of informal groups of 15-20 key actors allows for more effective knowledge and skills transfer. This is in line with the theory of community of practice put forward by Wenger (1998), where interaction between individuals is key in collective learning.
3. **Iterative Experimentation Cycle:** A trial-and-error process driven by KPIs provides room for actors to learn from mistakes and improve their practices. Observations over 50+ hours showed that this cycle created a sense of ownership among the participants.
4. **Digital Identity Construction:** The transition from "manual chef" to "digital guardian" reflects a significant change in identity in the way actors interact with technology.

The propositions resulting from this analysis are as follows:



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Malaysia, February, 11. 2026

Q1: Shared trauma can enhance collaborative sensemaking among actors.

Q2: Cross-border communities facilitate more effective transfer of competencies.

P3: Iterative experimentation results in continuous adaptive learning.

P4: A strong reflective identity can strengthen a commitment to the use of digital technologies.

Theme 3: Adaptive Capabilities (Output)

GAMF fulfills the objective of building an adaptive capability model of human resources by explaining the generative mechanism of human adaptation in the digital transformation of BGN's food supply chain. Theoretical Contributions: (1) Advance micro-foundations ala Felin et al. (2012) with the specification of 4 mechanisms; (2) Integration of the IPA Smith et al. (2022) + Weick (2005) sensemaking + community of practice; (3) Fill in the "black box" of digital MSDM in the style of Bondarouk & Harms (2020)³ and Dwiwarman (2025)⁶ for the context of emerging economy. Compared to Gioia et al. (2013), GAMF is more phenomenological; vs Lezoche et al. (2020), Agri-Food 4.0 applicability.

The result of this adaptation process is the emergence of adaptive capabilities characterized by flexibility, learning, innovation, and rapid response to change. The experience gained from the Cianjur incident has encouraged actors to develop new skills and adapt quickly to existing demands.

Theoretical Contributions

The GAMF model resulting from this research makes a significant contribution to understanding the micro-foundations of dynamic capabilities. GAMF explains the "black box" of HR adaptation by integrating the science approach and sensemaking theory. In addition, this research also emphasizes the importance of understanding the social and cultural context in the adaptation process.

Practical Implications

This research yields several practical implications that can be applied in the development of policies and practices at BGN. Among them are:

1. **Adaptive KPI Dashboard:** Development of a system to monitor the flexibility and responsiveness of HR in the face of challenges.
2. **Trauma-Informed Training:** A training program that considers the traumatic experiences experienced by key actors to enhance their capacity in dealing with crisis situations.
3. **Cross-Border Structure:** Encourage collaboration between actors by rewarding those involved in mentoring and knowledge transfer.
4. **Phased Roadmap:** An action plan that includes measures to stabilize and increase operational capacity at BGN.

CONCLUSION

To find out the GAMF Model as a Comprehensive Human Resources Adaptation Micro-Foundation Framework, this study succeeded in building a Generative Adaptive Micro-Foundations (GAMF) Model which explicitly explains the generative mechanism of human adaptation in the context of the digital transformation of the food supply chain in the ecosystem of the National Nutrition Agency (BGN) Partners. The model integrates post-traumatic subjective experiences, cross-boundary communities of practice, iterative experimentation cycles, and reflective digital identity construction as the micro-foundations of HR adaptive capabilities. GAMF advances the micro-foundation theory of dynamic capabilities by providing a detailed overview of how adaptive capabilities are formed through complex social and psychological processes, which have been a "black box" in the MSDM literature and digital change management. Thus, GAMF is not only a theoretical framework, but also a relevant analytical tool to understand and manage human resource adaptation in a dynamic and high-risk food system.

Meanwhile, to find out the Generative Mechanism as the Key to the Success of HR Adaptation in the Midst of Operational Paradoxes, researchers can identify four main generative mechanisms—collective trauma sensemaking, cross-border communities of practice, iterative experimentation cycles, and reflective digital identity construction—that synergistically shape the adaptive capabilities of human resources. This mechanism allows key actors in BGN to navigate the paradoxical pressures between operational efficiency needs and food safety imperatives, particularly in crisis situations such as the Cianjur mass poisoning incident. The vigilant sensemaking process triggered by collective trauma encourages collaboration and innovation, while cross-border communities of practice strengthen knowledge and skills transfer. The cycle of KPI-based iterative experimentation and reflection of digital identity reinforces the commitment to digital transformation. Thus, this generative mechanism is a practical foundation for building a resilient and responsive organization to rapid environmental changes.

Where in the final conclusion to find out the Practical and Strategic Implications for the Development of Human Resources Adaptive Capabilities in BGN, where the GAMF Model makes a significant practical contribution to the development of HR policies and practices in BGN. The implementation of an adaptive KPI dashboard allows for real-time monitoring of HR flexibility and responsiveness, while trauma-informed training programs help address psychological impacts and increase adaptation capacity. The establishment of cross-border structures that encourage collaboration and mentoring strengthens organizational cohesion and the development of collective competencies. The proposed phased digital transformation roadmap provides systematic guidance for stabilization, learning, and sustainable innovation. Thus, the GAMF not only answers theoretical challenges, but also provides a strategic blueprint to strengthen the adaptive capabilities of human resources in the face of digital disruption and food crises, which are critical to the sustainability of the national food system.

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