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The Interrelationships between Resource Orchestration, Collaborative Innovation, and Innovation Performance

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Abstract. This research aimed to explore the interrelationships between resource orchestration, collaborative innovation, and the total innovation performance in agricultural business owned by the Indonesian government. Investigation including 146 workers was carried out to analyse the impact of coordinating resources. The outcomes, obtained through PLS-SEM, showed a positive effect of resource coordination on both collaborative innovation and innovation performance. Additionally, collaborative innovation was identified as having a positive influence on innovation performance. The results showed that it was important to improve resource management, promote collaboration, and consistently improve innovation ability to promote competitiveness. The findings also contributed to the comprehension of resource coordination and offered valuable insights for promoting innovation in public sector organisation, particularly in agriculture. Moreover, further investigations were recommended to ascertain the applicability of the results in different contexts.

Keywords: Resource Orchestration, Collaborative Innovation, Innovation Performance, Regional Owned Enterprise

1. Introduction

The competition of company in current conditions is very visible in the manner establishment performs innovative activities (Xie et al., 2016). In the environment currently, the focus is on conventional innovation practices, where company can cope with accelerated technology conversions and rapidly changing market demands (Kim et al., 2017). As a result, the search and integration of external innovation resource are essential for company to innovate sustainably (Rauter et al., 2019). Based on these conditions, the concept of collaborative innovation has appeared in recent years as a new business paradigm (Xie et al., 2013). In business terms, collaborative innovation is defined as the interaction of an enterprise with different partners to accelerate internal innovation, which can include product or service innovation, innovation process, and management innovation (Y. Liu et al., 2017; Najafi-Tavani et al., 2018). Recently, many companies participate in collaborative innovation, enabling establishments to share knowledge with external partners and obtain access to new knowledge, resources, and technologies (Xie et al., 2013).

Collaborative innovation in company is determined by how the establishment can Resource Orchestration, thereby impacting innovation performance (Kumar et al., 2022). Resource in company plays an important role in achieving a better position in the market (J. B. Barney, 2001). This argument is supported by Asiaei & Bontis (2019) that resources have strategic momentum as a fundamental component of business strategy and practice. Accordingly, innovation performance is a strategic as well as an orchestrating resource and a process to introduce new methods and techniques that produce new products and services. In other words, it is a new combination of the old methods and techniques of converting into output to create economic and social value in the establishment (Fontana & Musa, 2017).

Research contributing to resource-based view theory (RBV) on resource organisation, collaborative innovation, and innovation performance is essential to helping the long-term growth of organisation and success in a dynamic business environment. Through optimal resource management, effective collaboration, and continuous improvement of innovation performance, organisation can become more innovative and competitive in the global market.

2. Review of Literature and Research Hypotheses

2.1. Resource Orchestration

According to Miller (2019), resource can be divided into three categories namely human-based resource, intangible resource, and tangible resource (materials and equipment), knowledge, and ability. According to RBV, the priceless, uncommon, unique, and adaptable resource strengthen the competitive advantage of businesses that are long-term sustainable (J. B. Barney, 2001; Madhani, 2010). RBV has come under fire for controlling the personalities and responsibilities of managers (Sirmon et al., 2007). Furthermore, it is enriched by the notion of resource orchestration, which emphasises these unnoticed components (Sirmon et al., 2007). To create a new paradigm of resource orchestration in business that focuses on how managers allocate resource to a competitive advantage, Sirmon et al. (2011) combined resource management framework and asset orchestrating theory. Resource orchestration refers to the act of organising, acquiring, and using resource of company to improve its competitive edge. Structurisation includes building resource portfolios through stabilisation, accumulation, and devastation. On the other hand, bundling requires managing resources to improve capacity through stabilising, enriching, and advancing. Lastly, leveraging, which includes mobilising and distributing, refers to using capacity to generate value. Creating business value for stakeholders requires the synthesis of these three processes (Sirmon et al., 2011). In a recent investigation, Kumar and colleagues (2022) applied the resource orchestration theory to explore how companies in regional industrial clusters organised resources to improve the innovation capabilities of member companies. The investigators also examined how these roles change as innovation projects progress. In a similar vein, Bakar & Ahmad (2010) and Martinez-Sanchez et al. (2019) examined how businesses develop resource portfolios and assemble a variety of resource to increase the ability to innovate during various stages of the life cycle.

Creative thinking requires effective management of resource (Maier et al., 2014). The concept of resource orchestration suggests that each resource has unique qualities, and coordinating strategically can lead to specific advantages. Emphasising the adaptability and complementary features of resource (Li & Jia, 2018; Taher, 2012), the interaction of resource establishes a direct link between resource orchestration and innovation. Simply using IT to combine resource in a new way is not enough to drive innovation in business, it is a necessary step but falls short of being a complete solution.

2.2. Innovation Performance

Innovation plays a central role in acquiring a sustainable competitive advantage (Teece *et al*., 1997). The ever-evolving, complex business landscape has made innovation an unavoidable consideration for improving company performance, promoting sustainable growth, and ensuring survival (Daellenbach *et al*., 1999). In this research, innovation is characterised as the introduction of socially and economically successful new technologies or novel combinations of existing technologies. This process transforms inputs into outputs, leading to radical or substantial changes in the perceived value and the relationship between monetary value (price) and consumer perception (Freitas *et al*., 2011). The measurement of innovation performance is primarily established at the individual project level (Salomo *et al*., 2007). However, the concept of innovation performance is generally applied in a broader context as a multidimensional construct (Daellenbach *et al*., 1999). At the project level, it consists of various sub-dimensions, which are subsequently integrated into a latent construct. In this research, innovation performance is defined as a multidimensional construct including the sub-dimensional aspects of aggregate innovation. This coverage includes input, process, output, and outcome facets in organisational innovation system.

2.3. Effect of Resource Orchestration on Collaborative Innovation

The simultaneous pursuit of innovation and growth in the customer base, whether in existing or new markets, is a widespread practice. Therefore, it is essential to understand how company effectively manages resource to nurture innovation. Resource management plays an essential role in generating innovation (Helfat *et a*l., 2007; Sirmon *et al*., 2011). According to experts, the primary source of innovation arises from rearranging existing conceptual and physical materials (Nelson & Winter, 1982; Fleming, 2007). Planning actions include the internal accumulation of resource, the acquisition of external resource, and the release of unproductive resource. Meanwhile, bundling strategies include stabilisation for gradual improvements, enrichment to expand existing ability, and pioneering new ability. Both planning and bundling are used to construct a resource portfolio and improve enterprise ability, driving innovation. Open and collaborative innovation includes integrating external ideas and ability into the process of developing new business initiatives (Tidd, 2014). By engaging with various external sources, such as universities, start-ups, and established players, company can access innovative ideas and developments beyond organisation. This collaborative approach accelerates time to market while sharing the risks and costs associated with innovation. In a disruptive business environment, where disruptors often arise from start-ups, company recognises the importance of adopting collaborative innovation strategies, including corporate venture capital (Van De Vrande, 2017). Research in this field shows that company included in venture capital investments has higher levels of innovation and superior market performance (Van De Vrande, 2017).

H1. Resource Orchestration positively influenced Collaborative Innovation.

2.4. Effect of Resource Orchestration on Innovation Performance

Every company encounters distinct opportunities and challenges, necessitating managers to customise resource portfolio of organisation and internal abilities for ongoing innovation (Sirmon et al., 2011). The process of promoting innovation demands specific skills derived from integrating both acquired and developed resource (Sirmon *et al*., 2007). It is crucial for innovation processes to draw insights

from how company typically manages resource (Sirmon *et a*l., 2011).

When company constructs its resource portfolio, various resources need to be combined in order to create the ability to perform tasks necessary for achieving strategic goals (Sirmon *et al*., 2007). In steering product development, the corporation should consistently improve the existing product (stabilisation). Furthermore, they need to expand the current capabilities (enriching) and develop an entirely new one (pioneer), which may potentially lead to radical innovation and promote organic growth through innovation (Sirmon et al., 2007). Every activity holds innovation potential, and the actions of managers to make an impact are possible to vary based on the context and the stage of the establishment in the life cycle.

M. Hitt *et al*., (2011) presented a strategic entrepreneurial input-process-output model, suggesting that creating value for customers and gaining a competitive advantage was the direct result of resource orchestration. Although financial wealth remains the primary goal of every company, entrepreneurs can also generate other forms of wealth, such as socio-emotional wealth and personal happiness (Berrone *et al*., 2010). Some short-term outcomes are expected to be significant, such as the development of new technology or innovation with value-creation potential.

H2. Resource Orchestration positively influenced Innovation Performance.

2.5. Effect of Collaborative Innovation on Innovation Performance

Company possesses a distinctive ability to absorb and replicate newly acquired knowledge from collaborative innovation activities. Mishra & Shah (2009) introduced the term collaborative competencies to describe ability. Typically, the ability to collaborate simultaneously with other companies in the supply chain network can provide an advantage in a competitive market. Collaborative innovation is the capability to include key partners in the supply chain simultaneously in the process, assessing its impact on performance (Mishra & Shah, 2009). The idea that company should externally integrate with collaborative partners in the supply chain network is already established (Simatupang, T. M., & Sridharan, 2002; Soosay et al., 2008; Mishra & Shah, 2009). Through case investigations, Soosay et al., (2008) showed that the ability of a company to collaborate with partners enables it to integrate into processes, improving efficiency and initiating innovation (Swink, 2006). It was stated that the collaboration ability of a company was crucial for innovative success. Building on Mishra & Shah (2009), experimental evidence supported collaborative competence and its impact on performance, showing that the benefits of collaborative innovation surpass the simultaneous participation of numerous partners in the project process.

H3. Collaborative Innovation positively influenced Innovation Performance.

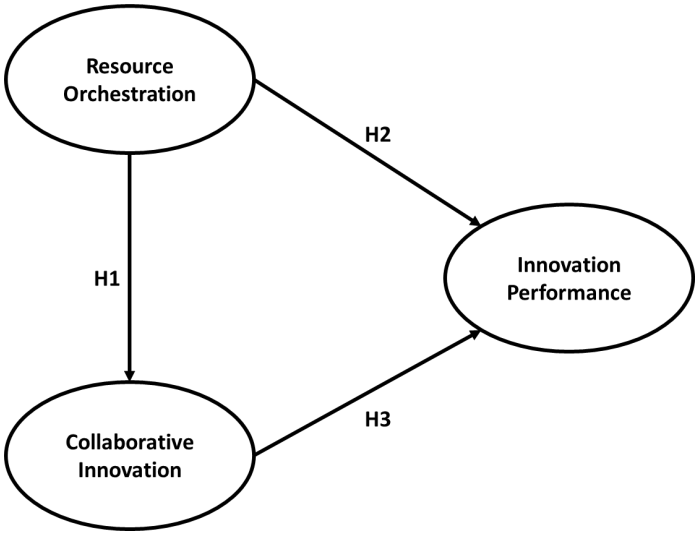


Fig.1: Research Hypothesis Model

3. Methodology

In this research, quantitative method was used through the distribution of questionnaires based on the Likert scale, ranging from 5 (strongly agree) to 1 (strongly disagree). The focus was on a population of 223 workers across six levels at PT. Food Station Tjipinang Jaya. A sampling method known as side probability, specifically stratified random sampling, was used. Following the solving formula with a 5% error rate, 146 samples were determined after rounding, representing various levels, including commissioners, management, division heads, section heads, and staff in Jakarta (Table 1).

In place of data analysis, partial least squares structural equation modelling (PLS-SEM) was used with SmartPLS 3.2.9 software. The initial stage included evaluating the measurement model, which included verifying Convergent Validity through outer loading and AVE values, examining Discriminant Validity through cross-loading values, Fornell-Larcker Criterion Test, Heterotrait-Monotrait Ratio (HTMT Test), and Composite Reliability Test, as well as assessing the structural model. The subsequent stage comprised hypothesis testing using a bootstrapping process, which provided calculated T values.

Table 1. Research Sample

No	Structure/Level (Position)	Sample Quantity
1	Level 1 = Commissioner	2
2	Level 2 = Management	2
3	Level 3 = Division Head	3
4	Level 4 = Head of Department	9
5	Level 5 = Section Chief	19
6	Level 6 = Staff	111
	Total	**146**

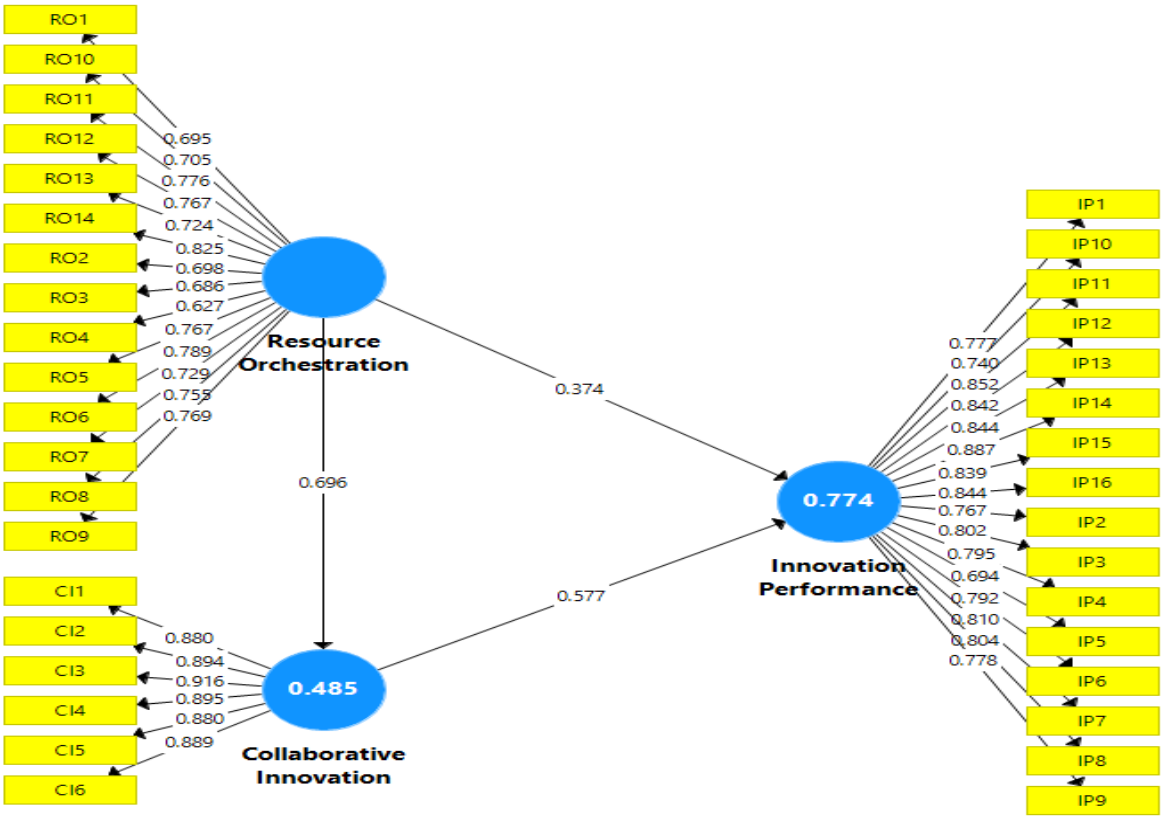
3.1. Measurements

All structures in this research were measured using the scale developed by Tuo-Chen & Qiao, (2017), which included 14 indicators for measurement. The evaluation of collaborative innovation used a scale created by Van de Vrande *et al.,* (2009) and Wang *et al.,* (2015)**,** incorporating specific compensatory components, leading to 6 indicators for measurement. Additionally, the assessment of innovation performance used a scale developed by Fortunato *et al.,* (2017)**,** which included 16 indicators for measurement. All the variables included in the research are listed in Appendix A (Scale Development).

4. Results

Statistical analysis was used to examine the research hypothesis using a method called PLS-SEM and SmartPLS 3.2.9 software. Following the approach defined by Henseler & Chin, (2010), the research explained in two phases to thoroughly analyse and interpret PLS results from Henseler & Chin, (2010). In the first phase, the measurement model was assessed by checking for Convergent Validity (examined through outer loading and AVE values), Discriminant Validities (reviewed through cross loading, Fornell-Larcker Criterion Test, and Heterotrait-Monotrait Ratio/HTMT Test), and a Composite Reliability Test. The second phase was dedicated to the evaluation of the Structural Model.

The assessment of the Measurement Model showed that every item in the control met the required minimum of 0.6 (Anderson and Black, 2010). The research was deemed reliable if the inquiry had a composite reliability value exceeding 0.70 and an alpha of Cronbach higher than 0.60. In terms of validity, an Average Variance Extracted (AVE) surpassing 0.50 was considered satisfactory (Ghozali, 2006).



Source: Obtained using SmartPLS software

Fig.2: Path Model in SmartPLS

Table 2. Results of a Reflective Model

Construct	Indicator	Outer Loadings	Cronbach's Alpha	Composite Reliability	AVE
Resource Orchestration	RO1	0.695			
	RO2	0.698			
	RO3	0.686			
	RO4	0.627	**0.935**	**0.943**	**0.545**
	RO5	0.767			
	RO6	0.789			
	RO7	0.729			

	RO8	0.755			
	RO9	0.769			
	RO10	0.705			
	RO11	0.776			
	RO12	0.767			
	RO13	0.724			
	RO14	0.825			
Collaborative Innovation	CI1	0.880	**0.949**	**0.959**	**0.797**
	CI2	0.894			
	CI3	0.916			
	CI4	0.895			
	CI5	0.880			
	CI6	0.889			
Innovation Performance	IP1	0.777	**0.964**	**0.967**	**0.649**
	IP2	0.767			
	IP3	0.802			
	IP4	0.795			
	IP5	0.694			
	IP6	0.792			
	IP7	0.810			
	IP8	0.804			
	IP9	0.778			
	IP10	0.740			
	IP11	0.852			
	IP12	0.842			
	IP13	0.844			
	IP14	0.887			
	IP15	0.839			
	IP16	0.844			

Source: Obtained using SmartPLS software

The results from a reflective model showed that resource orchestration construct had outer loading values for each indicator meeting the minimum requirement of 0.6. The smallest outer loading was for RO4 at 0.627, while the largest was for RO14 at 0.825. Additionally, the construct showed Cronbach's alpha value of 0.935, composite reliability of 0.943, and AVE of 0.545, all satisfying the reliability criteria. Furthermore, collaborative innovation construct also fulfilled the minimum requirements of 0.6 for each indicator. CI1 and CI5 had outer loadings of 0.880, with the highest value observed for CI3 at 0.916. The construct showed Cronbach's alpha value of 0.949, composite reliability of 0.959, and AVE of 0.797, meeting the reliability standards. Finally, innovation performance construct met the minimum requirements of 0.6 for each indicator. The smallest value, 0.694, was observed for IP5, while the largest, 0.887, was found for IP14. The construct demonstrated alpha of Cronbach value of 0.964, composite reliability of 0.967, and AVE of 0.649, meeting the reliability criteria. These criteria specify that the composite reliability value exceeded 0.70, and the alpha of Cronbach surpassed 0.60. Additionally, an Average Variance Extracted (AVE) value of 0.50 was achieved (Ghozali, 2006).

After assessing the reliability and convergent validity of the reflective constructs, the next step included establishing the discriminant validity of these constructs. Discriminant validity helps clarify how a construct sets itself apart from others in the model. The most cautious approach was to use the Fornell-Larcker criterion, which includes assessing the correlation with other constructs (Fornell & Larcker, 1981; Hair Jr et al., 2014; Leguina, 2015). A construct was considered valid by comparing the root value of Average Variance Extracted (AVE) using Fornell-Larcker Criterion with the correlation value between latent variables, and the root value of AVE needed to exceed the correlation between latent variables. As shown in Table 4, the model met the criteria for discriminant validity.

The results of testing Franklin–Lercker criterion for discriminant validity showed that the root of AVE for each construct surpassed the correlation with other variables, where the AVE root value was

0.893. This value exceeded the correlation with other constructs, specifically through collaborative correlation of Innovation including innovation performance at 0.838 and the correlation through resource orchestration at 0.696. This pattern held for other constructs as well, where the AVE root value consistently exceeded the correlation with other constructs. Subsequently, all AVE root values for constructs exceeded the correlations through other constructs, and the model fulfilled the requirements for discriminant validity, as shown in Table 4.

Table 4. Fornell–Larcker Criterion to Discriminant Validity of the Model

	Collaborative Innovation	Innovation Performance	Resource Orchestration
Collaborative Innovation	**0.893**		
Innovation Performance	**0.838**	**0.806**	
Resource Orchestration	**0.696**	**0.776**	**0.738**

Source: Obtained using SmartPLS software

The evaluation of the structural model included a bootstrapping process, leading to the computation of T values. If the obtained T value exceeded the t-statistic at a 95% confidence level (1.96), the hypothesis was considered significant.

Collaborative innovation had a significant influence on innovation performance through bootstrapping, surpassing 1.96 (6.076) in the t-count analysis. Furthermore, there was a significant effect of resource orchestration on collaborative innovation, exceeding 1.96 (13.15). Finally, a significant effect of resource orchestration on innovation performance, surpassing 1.29 (3.784), was observed, as shown in Table 5.

Table 5. Structural Model

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Collaborative Innovation -> Innovation Performance	**0.577**	**0.578**	**0.095**	**6.076**	**0.000**
Resource Orchestration -> Collaborative Innovation	**0.696**	**0.701**	**0.053**	**13.15**	**0.000**
Resource Orchestration -> Innovation Performance	0.374	0.375	0.099	3.784	0.000

Source: Obtained using SmartPLS software

5. Discussion

The results of the hypothesis test clarified the results of this research, showing how resource orchestration could create a competitive advantage through collaborative innovation. This supports resource-based perspective, stating that company gained a competitive edge by having diverse, valuable, rare, and unique resource (Barney, 1991; Wernerfelt, 1984). To address this issue, resource orchestration showed that collaborative efforts including various resource, ability, and managerial expertise could provide a competitive advantage for company, supply chain, and network (Chadwick et al., 2015; Gong et al., 2018; Liu et al., 2016; Sirmon et al., 2011). According to Kumar et al., (2022), company played a crucial role in collaborating with other organisations to structure, merge, and use resource to create new opportunities. After reaching an agreement and forming a working team, company took on the role of an orchestrator to blend and improve resource, to achieve desired outcomes for both company and organisation (Andersén &; Ljungkvist, 2021; Badrinarayanan et al., 2019; Madhani, 2010).

Company implementing resource orchestration for workers used various strategies. One distinguished approach included reshaping the workforce through Upskilling and Reskilling initiatives.

Upskilling focused on individuals acquiring new skills to improve the existing careers, while Reskilling centred on individuals acquiring new skills for different fields or careers. Another tactic included the introduction of scholarship programmes, offering support to workers pursuing undergraduate studies to encourage higher education opportunities and future professional development. Additionally, company experienced technological advancements. Initially, maintained a website showcasing corporate events, but transformed into a web store. This change facilitated online transactions for customers, providing customers with a convenient way to order products and services from *PT Food Station Tjipinang Jaya*.

PT. Tjipinang Jaya Food Station organised resource management practices into three sectors: upstream, production & distribution, and downstream. Furthermore, in upstream sector, company collaborated through resource orchestration, specifically through contract farming (as a standby buyer or off-taker) and on-farming (agricultural cultivation) in conjunction with farmer groups *(GAPOKTAN*). In production & distribution sector, the establishment strategically managed resource by partnering with production entities in various regions, expanding warehouses to optimise stock storage for a balanced supply between harvest and famine periods. This sector also implemented integration zones, streamlining activities from raw material acquisition, production, and storage to distribution in the operational unit. Additionally, in the downstream sector, collaboration through stakeholders took place in both assignment and commercial sub-sectors. The assignment sub-sector included subsidised low-cost food programmes, social assistance *(BANSOS*), and market operations. In the commercial sub-sector, collaboration extended to modern markets, traditional markets, and *HOREKA* (Hotels, Restaurants, and Catering/Cafes). Moreover, company managed resource through a community empowerment programme (supported by corporate social responsibility). In response to job losses due to the Covid-19 pandemic, the corporation initiated a motorist programme, empowering residents to distribute food products to lower-class citizens or MSMEs by motorcycle. The COVID-19 situation prompted company to adopt collaborative innovation, introducing concepts similar to large houses and necessities. This included supporting MSMEs in sales and distribution, and ensuring public access to affordable rice and necessities were optimised.

The results of the hypothesis test indicated that resource orchestration had the potential to improve collaboration among different resource, including expertise, technology, and capital. This implied that each resource played a unique role in adding value to company (Smedlund & Faghankhani, 2015). By improving synergies among this resource, company could improve the efficiency and effectiveness of their operations, leading to increased innovation (Manzoor et al., 2022; Moshtari, 2016; Suh & Kim, 2012).

Following Milwood & Roehl, (2018), resource orchestration rendered team collaboration more effective in creating innovation. Diverse teams with varied expertise were able to collaborate and generate superior innovative solutions (Edmondson, 2012). Resource orchestration streamlined team collaboration, making it more accessible, effective, and efficient (Proctor, 2010). Furthermore, resource orchestration improved monitoring and control more than enterprise resource usage (Kumar et al., 2022). This implied that resource orchestration significantly influenced innovation performance by strengthening resource synergies, thereby promoting better team collaboration, and improving monitoring and control over enterprise resource use (Cui et al., 2022; Tang et al., 2023; Tuo-Chen & Qiao, 2017).

Company assessed the operations, reducing non-value-added activities to focus on the value chain. Integrating with production partners who had grain production machines and collaborating with farmer groups as raw material sources optimised the distribution process. This permitted production partners to distribute products directly without the need for central processing. Additionally, for sustainable New Product Development innovation, company partnered with National Research and Innovation Agency *(BRIN*) and universities in the food sector to develop vitamin rice products (referred to as fortified rice). The corporation also intensively collaborated with farmer groups to produce premium-quality rice.

The results of the test showed that collaborative innovation referred to a partnership between different entities in order to produce high-quality innovation and create value for all parties included (Walters &; Rainbird, 2007). Simultaneously, innovation performance denoted the ability of organisation to successfully create, develop, and implement innovation (Alegre &; Chiva, 2008).

Through collaboration, organisation could combine resource and expertise from different parties, thereby improving the ability to create high-quality innovation (Castillo-Vergara et al., 2021). The test was performed to bring together resource and expertise which eventually promoted creativity and generated new ideas. In a collaborative setting, teams were made up of individuals with diverse backgrounds, experiences, and perspectives. This diversity sparked creativity and generated new ideas that could benefit organisation. In this situation, the improvement of innovation performance contributed to improving the total innovation performance of organisation. Therefore, collaboration was essential as a strategy for creating quality innovation and improving organisational performance (Daradkeh, 2022; Gupta et al., 2021).

Company had the potential to establish strategic collaboration with other entities or institutions possessing complementary expertise or resource to develop superior innovative solutions. Company collaborated with farmer groups, communities around production partners, *BRIN* research institutions, and universities to stimulate market growth, specifically in the food sector. In addition, the positive impact of the establishment successfully maintained food security in main areas and surrounding buffer zones. Expanding on this success, the establishment replicated its system outside Jakarta, covering surrounding buffer areas such as Bogor, Depok, Tangerang, and Bekasi. Moreover, innovation performance of the establishment earned various awards from independent institutions, recognising operational business excellence, product quality, human capital resilience, and CSR excellence.

6. Conclusion

In conclusion, the COVID-19 pandemic had a significant impact on company, affecting revenue, and sales, and causing disruptions in marketing and distribution efforts. These challenges arose due to government policies implemented during the pandemic, leading to changes to the usual operations of the corporation. To address these issues, company had to actively request effective solutions. Furthermore, by applying RBV in the food sector, the establishment could draw on expertise and perspectives from various parties to generate creative and diverse ideas for strategic resource allocation. In response, *PT. Food Station Tjipinang Jaya* developed business process flows exploring collaborative opportunities. This included establishing partnerships for production flows and product distribution and collaborating with production partners, farmer groups, and local communities. The objective of the collaboration was to uphold food security and streamline distribution flows across upstream, production, and downstream sectors by minimising non-value-added activities. Further cooperation included empowering the community through initiatives similar to the Rice House and Basic Food programs, as well as the Motorist program. The latter facilitated MSMEs in optimising access to product distribution and affordability. These strategic measures represented mutually beneficial solutions for company. However, effective resource orchestration played a crucial role in promoting creativity and collaboration in teams, leading to improved innovation performance. *PT. Food Station Tjipinang Jaya* showed this approach in product development by collaborating with *BRIN* and universities specialising in food-related research programs. This collaboration led to innovation of vitamin rice (fortification). Essentially, resource orchestration provided benefits to collaborative innovation and innovation performance by improving efficiency and productivity, leading to faster and more effective innovation.

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Appendix A: Scale Development

Construct	Indicators	Item
Resource Orchestration	RO1	Resource integration
	RO2	Resource expansion
	RO3	Gathering key information
	RO4	Integrating new products
	RO5	Integrating knowledge
	RO6	Following up on changes
	RO7	Follow up evaluation
	RO8	Maintenance of various systems
	RO9	Implementation of resource integration
	RO10	Finding new resources
	RO11	Creating a new system
	RO12	Assess the resources
	RO13	Assess core technology
	RO14	Heterogenized the management of various resources
Collaborative Innovation	CI1	Mastering new technologies
	CI2	Building Capacity
	CI3	Repair an existing product
	CI4	Increase the quantity of knowledge
	CI5	Improve the quality of knowledge
	CI6	Improve the product development process
Innovation Performance	IP1	New innovations on the product
	IP2	New innovations on technology
	IP3	New innovations in business processes
	IP4	Adopting a new management system
	IP5	Entering a new market
	IP6	Build an intense relationship
	IP7	New creative ways
	IP8	Open to new technology
	IP9	Consolidation of organizational knowledge
	IP10	Quality improvement on the product
	IP11	Product reliability improvements
	IP12	Technical improvements to the product
	IP13	Improve the production process on the product
	IP14	Corporate Management Improvements
	IP15	Conducting customer needs research
	IP16	Technical improvements to the product