

Enhancing Supply Chain Resilience: Strategies and Practices for Mitigating Business Risks in The Retail Gas Industry of Nueva Ecija

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Abstract: This study determines risk mitigation strategies and practices in the retail gas sector of Nueva Ecija, utilized descriptive correlational research methods. Data gathering included distributing a researcher-made survey questionnaire to 150 respondents, consisting of 50 managers, employees, and customers across five cities within Nueva Ecija.

The study findings reveal significant insights into the family-owned businesses in the retail gas sector of Nueva Ecija, highlighting their operational characteristics and risk management practices. Family-owned businesses, particularly those operating for 5 to 10 years with 5 to 10 employees, constitute a prominent segment. In this sector, emphasis is placed on adaptive capacity, environmental practices, and proactive measures to address emerging risks. Mitigating supply chain risks is crucial, with strategies like supplier diversification, inventory management adjustments, and leveraging digital technologies being key. The acceptance of the null hypothesis indicates that socio-demographic factors of respondents do not significantly influence risk mitigation practices. Building upon these findings, a proposed plan has been developed to enhance risk management within the retail gas industry. This plan encompasses activities tailored to address vulnerabilities, enhance resilience, and optimize operations, ultimately aiming to equip stakeholders with effective strategies for long-term success in a dynamic environment.

Keywords: adaptive capacity, environment, emergence, adaptation

I. Introduction

The evolution of supply chain risk management (SCRM) literature initially involved applying organizational risk management practices to supply chains (Fan & Stevenson, 2018; Norrman & Wieland, 2020). These practices aimed to identify, assess, control, and monitor various risk sources within an organization. However, a critical distinction lies between traditional organizations and supply chains.

Organizations, though complex, operate within defined legal and geographical boundaries, theoretically allowing for the compilation of a comprehensive list of risk sources. In contrast, supply chains are characterized using complexity theory. They are expansive networks encompassing numerous organizations, interconnected links, and emergent system characteristics due to their inherent complexity and dynamic nature (Choi et al., 2001; Nilsson, 2019).

In the retail gas sector of Nueva Ecija, maintaining a consistent gas supply to consumers stands as a pivotal priority. This industry confronts multifaceted challenges that can disrupt the supply chain, impacting both businesses and customers. Factors such as natural disasters, logistical issues, and fluctuations in gas availability pose risks to the smooth flow of gas products to retail outlets. Overcoming these hurdles demands the deployment of resilient strategies and practices within the supply chain. Strengthening resilience ensures an unbroken and dependable gas supply, aligning with the region's demand.

By fortifying the supply chain against potential disruptions, businesses can safeguard operations while ensuring customers have continuous access to gas. This imperative task involves fortifying the chain's adaptability and reliability, securing a stable gas provision despite various challenges encountered in Nueva Ecija's retail gas industry. Ensuring an uninterrupted gas supply remains a critical objective in Nueva Ecija's retail gas sector.

The industry faces a spectrum of challenges that threaten the seamless flow of gas to consumers and affect the functioning of businesses. Natural disasters, logistical complexities, and erratic gas availability stand out as significant risks that can disrupt the distribution chain, impacting retail outlets and their clientele. Addressing these challenges necessitates the implementation of robust strategies and adaptable practices within the supply chain.

However, there is a gap in the existing literature regarding the specific strategies and practices required to enhance supply chain resilience in the retail gas industry of Nueva Ecija. While the importance of supply chain resilience has been recognized, there is a lack of comprehensive research focusing on the unique challenges and potential solutions within this industry in the region. Therefore, this study aims to fill this gap by investigating the strategies and practices that can mitigate business risks and enhance supply chain resilience in the retail gas industry of Nueva Ecija.

The study contributed to the existing body of knowledge by providing insights into the specific strategies and practices that can be employed to enhance supply chain resilience in the retail gas industry of Nueva Ecija. By identifying and addressing the gaps in

the current literature, this research will provide valuable recommendations to businesses and stakeholders in the industry, enabling them to mitigate risks and ensure a sustained and reliable gas supply.

II. Methodology

This study employed descriptive correlational research to examine the current state of phenomena and their relationship to variables or conditions. The methods utilized surveys to depict the current situation, correlation studies to explore variable relationships, and developmental studies to track changes over time. Conducted across five cities in Nueva Ecija—San Jose City, Cabanatuan City, Gapan City, Palayan City, and Science City Muñoz—the research employed purposive sampling. This method involved selecting participants such as gasoline station owners or managers, employees, and customers within the province. Participants were chosen based on specific criteria aligned with the research objectives. The researcher directly approached and selected individuals meeting these criteria, utilizing established business lists or professional networks. This approach ensured that respondents possessed relevant knowledge and experience, closely aligning with the research goals.

III. Results and Discussion

Part 1. Profile of the respondents -

Years of Operation	Frequency	Percent
below 5	4	8.0
5-10	25	50.0
11-15	18	36.0
16 - 20	3	6.0
Total	50	100.0
Ownership	Frequency	Percent
Family Owned	39	78.0
Corporation	11	22.0
Total	50	100.0
Number of employees	Frequency	Percent
below 5	17	34.0
5 – 10	29	58.0
11-15	4	8.0
Total	50	100.0

The respondent profile offers insights into their distribution based on years of operation. The majority, comprising 25 or 50.0 percent, have operated for 5-10 years. Following this, 18 respondents, making up 36.0 percent, have been in operation for 11-15 years. Meanwhile, 4 respondents, computed for 8.0 percent, belong to the category of less than 5 years in operation. The dominance of respondents within the 5-10 years operational range implies a critical juncture for the retail gas industry in Nueva Ecija. At this stage, businesses are likely focused on solidifying their market position, optimizing operations, and navigating competitive landscapes.

In terms of ownership reveals that the majority, comprising 39 respondents or 78.0 percent, own family-owned businesses. Additionally, 11 respondents, representing 22.0 percent, own corporations. This implies a strong tradition of family involvement and entrepreneurship within the sector, with many businesses being passed down through generations or started as family ventures. Such a concentration within the family-owned category emphasizes the unique dynamics and characteristics of businesses operating within familial structures, which can influence decision-making processes, organizational culture, and long-term strategic planning.

For the number of employees in their respective businesses. Among the respondents, 29 or 58.0 percent reported having 5 to 10 employees, followed by 17 or 34.0 percent with fewer than 5 employees, and 4 or 8.0 percent with 11 to 15 employees.

The majority of respondents, comprising 58.0 percent, fall within the range of 5 to 10 employees. This indicates a prevalent operational scale among businesses in the retail gas industry of Nueva Ecija. With the significant majority clustered in this category, it implies that many enterprises within the sector maintain a moderate workforce size to manage their day-to-day operations effectively.

Further, the dominance of the 5 to 10 employees category emphasizes the common operational structure and resource allocation strategy adopted by businesses in the industry. It implies that these enterprises likely prioritize efficiency, productivity, and cost-effectiveness in their operations. This understanding is crucial for stakeholders aiming to formulate targeted strategies that address the specific needs and challenges associated with this prevalent workforce scale.

Part 2 Practices for mitigating business risks in the supply chain of the retail gas industry

No.	Adaptive Capacity	Manager		Employee		Customer	
		w.m.	v.d.	w.m.	v.d.	w.m.	v.d.
1.	Supply chain promptly adapts to unforeseen changes in demand and supply fluctuation	3.70	H. P	3.64	H. P	3.08	M.P
2.	Possess robust plans to manage disruptions effectively within supply chain infrastructure.	3.46	H. P	3.70	H. P	2.96	M.P
3.	Gas business technologies are effectively integrated to swiftly adjust to market shifts and demands.	3.56	H. P	3.72	H. P	3.16	M.P
4.	Supplier base diversification mitigates risks effectively, ensuring supply chain stability.	3.50	H. P	3.68	H. P	2.92	M.P
5.	Employee-driven innovative solutions are encouraged and valued during supply chain challenges.	3.60	H. P	3.52	H. P	3.04	M.P
6.	Logistic and operational modifications are swiftly executed when facing unexpected disruptions.	3.54	H. P	3.54	H. P	3.06	M.P
7.	Regular assessments and updates in risk mitigation strategies enhance our adaptive capabilities.	3.50	H. P	3.50	H. P	3.04	M.P
8.	Organizational culture prioritizes adaptability and readiness for change within the supply chain.	3.48	H. P	3.48	H. P	2.90	M.P
	A.W.M	3.55	H. P	3.60	H. P	3.02	M.P

Legend: 3.25-4.00 Highly Practiced (H.P) 2.50-3.24 Moderately Practiced (M.P) 1.75-2.49 Slightly Practiced (S.P) 1.00-1.74 Not Practiced at all (NPA)

The table outlines the strategies employed to mitigate business risks in the supply chain of the retail gas industry, focusing on adaptive capacity for managers, employees, and customers.

For manager, Item 1, "supply chain promptly adapts to unforeseen changes in demand and supply fluctuation" obtained the highest weighted mean of 3.70, verbally described as "highly practiced." In contrast, item 2, "Possess robust plans to manage disruptions effectively within supply chain infrastructure" got a lowest weighted mean of 3.46, although it is still described as "highly practiced".

The overall average weighted mean of 3.55 shows that the practices for mitigating business risks in the supply chain, in terms of adaptive capacity, are widely implemented within the retail gas industry in Nueva Ecija. This reflects a strong focus on risk mitigation and adaptability in the industry's supply chain management. However, the findings also highlight the need for continuous improvement, particularly in terms of developing robust strategies to manage disruptions effectively (Haertel, 2022).

For employees, Item 2, "Possess robust plans to manage disruptions effectively within the supply chain infrastructure," obtained the highest weighted mean of 3.70, verbally described as "highly practiced". Meanwhile, Item 8, "Organizational culture prioritizes adaptability and readiness for change within the supply chain," received the lowest weighted mean of 3.48, verbally described as "Highly Practiced." This indicates that while the organization values adaptability and change readiness within its supply chain, there may be room for improvement or implementation challenges.

Overall, the practices for mitigating business risks in the supply chain of the retail gas industry in terms of adaptive capacity for employees' respondents obtained weighted mean of 3.60 verbally described as "Highly Practiced. Indicates that the practices for

mitigating business risks in the supply chain of the retail gas industry, particularly in terms of adaptive capacity for employee respondents, are robust and well-implemented.

For customers, Item 3, "Gas business technologies are effectively integrated to swiftly adjust to market shifts and demands," received the highest weighted mean of 3.16, verbally described as "Moderately Practiced." Meanwhile, Item 8, "Organizational culture prioritizes adaptability and readiness for change within the supply chain," received a lowest weighted mean of 2.90, verbally described as "Moderately Practiced."

Overall, the practices for mitigating business risks in the supply chain of the retail gas industry in terms of adaptive capacity for respondents' customers obtained weighted mean of 3.02 verbally described as "Moderately Practiced. Indicates that the practices for mitigating business risks in the supply chain of the retail gas industry are somewhat effective but may require further enhancement.

Practices for mitigating business risks in the supply chain of the retail gas industry in terms of environment

No.	Environment	Manager		Employee		Customer	
		M	V.D	M	V.D	M	V.D
1.	Environmental factors significantly impact our supply chain operations, posing potential risks and challenges.	3.62	H. P	3.50	H. P	2.94	M. P
2.	Regulatory changes profoundly influence our industry's dynamics, necessitating continuous adaptation and flexibility.	3.48	H. P	3.54	H. P	2.98	M. P
3.	Socio-economic conditions directly impact our business, necessitating agile strategies to navigate varying market landscapes.	3.60	H. P	3.64	H. P	2.96	M. P
4.	Technological advancements profoundly shape our industry, requiring constant innovation to remain competitive and resilient.	3.60	H. P	3.62	H. P	2.93	M. P
5.	Natural calamities or disasters significantly affect our supply chain, demanding robust contingency plans and proactive measures.	3.60	H. P	3.66	H. P	3.12	M. P
6.	Market demand fluctuations directly impact our operations, demanding quick adaptations to maintain supply chain efficiency.	3.50	H. P	3.60	H. P	3.08	M. P
7.	Political changes in the region have notable implications for our industry, necessitating swift adjustment and strategic planning.	3.64	H. P	3.76	H. P	3.04	M. P
8.	Cultural shifts and consumer preferences influence our business strategies, requiring continual adaptation and market alignment.	3.58	H. P	3.46	H. P	3.06	M. P
	A.W.M	3.58	H. P	3.60	H. P	3.02	M. P

Legend: 3.25-4.00 Highly Practiced (H.P) 2.50-3.24 Moderately Practiced (M.P) 1.75-2.49 Slightly Practiced (S.P) 1.00-1.74 Not Practiced at all (NPA)

The table presents the practices for mitigating business risks in the supply chain of the retail gas industry, specifically focusing on the environmental for managers, employees and customers.

For managers. Item 7, "Political changes in the region have notable implications for our industry, necessitating swift adjustment and strategic planning" received the highest weighted mean of 3.64, indicating that it is considered "highly practiced." Conversely, Item 2, "Regulatory changes profoundly influence our industry's dynamics, necessitating continuous adaptation and flexibility" obtained a slightly lower weighted mean of 3.48, although it is still described as "highly practiced".

The overall weighted mean for the practices related to mitigating business risks in the supply chain of the retail gas industry in terms of the environment is 3.58, which is categorized as "highly practiced". This indicates that there is a strong emphasis on addressing environmental factors and their potential impacts on the industry.

For employees, item 7, "Political changes in the region have notable implications for our industry, necessitating swift adjustment and strategic planning," obtained the highest weighted mean of 3.76, verbally described as "Highly practiced. Meanwhile, item 8, "Cultural shifts and consumer preferences influence our business strategies, requiring continual adaptation and market alignment," received a lowest weighted mean of 3.46, verbally described as "highly practiced."

Overall, the practices for mitigating business risks in the supply chain of the retail gas industry, specifically on the environmental for employees has an average weighted mean of 3.02 verbally described as "Moderately Practiced", means that while efforts are being made to address environmental risks affecting employees in the retail gas supply chain, there is room for improvement. The "Moderately Practiced" rating implies that progress has been made, but there is still a need for increased attention and action to effectively manage environmental risks in the retail gas industry's supply chain, thereby fostering a safer and healthier work environment for employees (Owuso S. 2022).

For customers, item 5, "Natural calamities or disasters significantly affect the supply chain, demanding robust contingency plans and proactive measures," obtained a highest weighted mean of 3.12, verbally described as "Moderately Practiced." Meanwhile, item 4, "Technological advancements profoundly shape industry, requiring constant innovation to remain competitive and resilient," received a lowest weighted mean of 2.93, described as "Moderately Practiced."

Overall, the average weighted mean of 3.02, verbally described as "Moderately Practiced," for mitigating business risks in the supply chain of the retail gas industry, particularly focusing on environmental considerations for customers, implies that there is a moderate level of implementation of risk mitigation practices. This indicates that while efforts are being made to address business risks related to environmental factors in the supply chain, there is room for improvement in terms of the comprehensiveness and effectiveness of these practices (S. Owuso & R. Godday, 2022).

Practices for mitigating business risks in the supply chain of the retail gas industry in terms of emergence

No.	Emergence	Manager		Employee		Customer	
		M	V.D	M	V.D	M	V.D
1.	New challenges unpredictably arise, impacting our supply chain, requiring adaptive strategies for timely and effective solutions.	3.48	H. P	3.60	H. P	2.91	M. P
2.	Unexpected opportunities emerge, influencing our industry, demanding quick responses to leverage and capitalize on these instances.	3.66	H. P	3.62	H. P	3.04	M. P
3.	Unforeseen disruptions prompt changes in our operations, necessitating agile approaches to maintain supply chain efficiency.	3.50	H. P	3.74	H. P	3.04	M. P
4.	New market trends unexpectedly surface, influencing our strategies, requiring rapid adjustments to align with emerging demands.	3.58	H. P	3.62	H. P	3.04	M. P
5.	Industry innovations emerge unpredictably, influencing our practices, demanding swift integration to stay competitive and resilient.	3.60	H. P	3.62	H. P	3.00	M. P
6.	Sudden shifts in consumer behavior impact our operations, necessitating prompt adaptations to meet evolving market preferences.	3.58	H. P	3.62	H. P	2.90	M. P
7.	Unplanned external events unexpectedly affect our supply chain, demanding proactive measures for effective risk mitigation.	3.70	H. P	3.56	H. P	3.00	M. P
8.	Emerging disruptions or advancements shape our industry landscape, requiring agile responses to maintain resilience and competitiveness.	3.46	H. P	3.58	H. P	3.10	M. P
	A.W.M.	3.57	H. P	3.62	H. P	3.00	M. P

Legend: 3.25-4.00 Highly Practiced (H.P) 2.50-3.24 Moderately Practiced (M.P) 1.75-2.49 Slightly Practiced (S.P) 1.00-1.74 Not Practiced at all (NPA)

The table presents the practices for mitigating business risks in the supply chain of the retail gas industry, specifically focusing on the aspect of emergence.

For managers, item 7, "Unplanned external events unexpectedly affect our supply chain, demanding proactive measures for effective risk mitigation" received the highest weighted mean of 3.70, indicating that it is considered "highly practiced." On the other hand, the statement 8, "Emerging disruptions or advancements shape our industry landscape, requiring agile responses to maintain resilience and competitiveness" obtained a slightly lower weighted mean of 3.46, although it is still described as "highly practiced".

The overall average weighted mean for the practices related to mitigating business risks in the supply chain of the retail gas industry in terms of emergence is 3.57, which is categorized as "highly practiced". This indicates that there is a strong emphasis on addressing emerging risks and disruptions within the industry (Williams & Davis, 2023).

For employees, item 7, "New challenges unpredictably arise, impacting our supply chain, requiring adaptive strategies for timely and effective solutions" obtained a highest weighted mean of 3.60, verbally described as "highly practiced ".In contrast, item 8, "Cultural shifts and consumer preferences influence our business strategies, requiring continual adaptation and market alignment" got a lowest weighted mean of 3.46 verbally described as " highly practiced". In contrast, item 8, "Cultural shifts and consumer preferences influence our business strategies, requiring continual adaptation and market alignment" received a lowest weighted mean of 3.46, described as "highly practiced".

Overall, the weighted mean of 3.62, described as "highly practiced," suggests that the practices for mitigating business risks in the supply chain of the retail gas industry, particularly concerning employee emergence, are consistently implemented and well-established. This rating indicates a strong level of adherence to risk mitigation protocols, indicating that the organization places significant emphasis on ensuring the safety and effectiveness of its supply chain operations in relation to employee emergence. By being highly practiced, these strategies likely encompass comprehensive measures to address various aspects of risk management, ensuring that potential challenges related to employee emergence are proactively identified, assessed, and effectively mitigated (Salles, F. 2021).

For customers, item 8," Emerging disruptions or advancements shape our industry landscape, requiring agile responses to maintain resilience and competitiveness" with a weighted mean of 3.12 and described as "moderately practiced". Meanwhile, item 6, "New market trends unexpectedly surface, influencing our strategies, requiring rapid adjustments to align with emerging demands", obtained a lowest weighted mean of 2.90, verbally described as "moderately practiced".

Overall, the practices for mitigating business risks in the supply chain of the retail gas industry in terms of emergence for customers has an average weighted mean of 3.00 verbally described as "moderately practiced." The description implies that the organization acknowledges the importance of addressing risks related to customer emergence in the supply chain but may not be fully proactive or comprehensive in their approach.

Practices for mitigating business risks in the supply chain of the retail gas industry in terms of adaptation

No.	Adaptation	Manager		Employee		Customer	
		M	V.D	M	V.D	M	V.D
1.	Supply chain promptly adjusts to unforeseen changes in market demands, ensuring operational flexibility and responsiveness.	3.58	H. P	3.64	H. P	2.92	M. P
2.	Adaptation strategies are integral in managing sudden disruptions, enabling swift recovery and maintenance of supply chain continuity.	3.46	H. P	3.68	H. P	3.02	M. P
3.	Agile responses to technological advancements ensure competitiveness, allowing seamless integration for enhanced supply chain efficiency	3.58	H. P	3.52	H. P	2.76	M. P
4.	Flexibility in procurement practices enables quick shifts in supplier sources, ensuring supply stability during unforeseen shortages.	3.66	H. P	3.60	H. P	2.92	M. P
5.	Readiness for regulatory changes ensures compliance, facilitating smooth adaptation to evolving industry standards and market dynamics.	3.68	H. P	3.68	H. P	3.00	M. P

6.	Timely adaptations to environmental challenges bolster resilience, allowing proactive measures to counteract potential risks to the supply chain.	3.60	H. P	3.62	H. P	3.06	M. P
7.	Swift operational adjustments during unforeseen disruptions demonstrate our adaptability, ensuring minimal impact on supply chain functionalities.	3.46	H. P	3.70	H. P	2.98	M. P
8.	Adaptive approaches in customer service and market strategies align our operations with emerging consumer preferences and behaviors.	3.58	H. P	3.54	H. P	2.96	M. P
	A.W.M.	3.58	H. P	3.62	H. P	2.95	M. P

Legend: 3.25-4.00 Highly Practiced (H.P) 2.50-3.24 Moderately Practiced (M.P) 1.75-2.49 Slightly Practiced (S.P) 1.00-1.74 Not Practiced at all (NPA)

The table presents the practices for mitigating business risks in the supply chain of the retail gas industry, specifically focusing on adaptation for managers, employees, and customers.

For managers, Item 5, "Our readiness for regulatory changes ensures compliance, facilitating smooth adaptation to evolving industry standards and market dynamics" received the highest weighted mean of 3.68, indicating that it is considered "highly practiced". Conversely, item 7, "Swift operational adjustments during unforeseen disruptions demonstrate our adaptability, ensuring minimal impact on supply chain functionalities" obtained a slightly lower weighted mean of 3.46, is still described as "highly practiced."

The overall average weighted mean for the practices related to mitigating business risks in the supply chain of the retail gas industry in terms of adaptation is 3.58, which is categorized as "highly practiced". This indicates that there is a strong emphasis on adaptability within the industry (Williams & Davis, 2023).

For employees, item 7, "Swift operational adjustments during unforeseen disruptions demonstrate our adaptability, ensuring minimal impact on supply chain functionalities" obtained weighted mean of 3.70 verbally described as "highly practiced". Meanwhile, item 3, "Agile responses to technological advancements ensure our competitiveness, allowing seamless integration for enhanced supply chain efficiency" got a lowest weighted mean of 2.76 verbally described as "Highly Practiced".

Overall, the practices for mitigating business risks in the supply chain of the retail gas industry, focusing on adaptation for employees, has a weighted mean of 3.62 verbally described as "highly effective." It implies that employees are adept at responding to challenges, ensuring smooth operations, and minimizing disruptions within the supply chain. The emphasis on adaptation reflects a proactive approach to addressing evolving industry dynamics and maintaining resilience in the face of uncertainties.

For customers, timely adaptations to environmental challenges bolster resilience, allowing proactive measures to counteract potential risks to the supply chain" got a highest weighted mean of 3.06 verbally described as "moderately practiced". Meanwhile, item 3, "Agile responses to technological advancements ensure our competitiveness, allowing seamless integration for enhanced supply chain efficiency" got a lowest weighted mean of 2.76 verbally described as "Moderately Practiced."

Overall, the practices for mitigating business risks in the supply chain of the retail gas industry, focusing on adaptation for customers, has a weighted mean of 2.98 verbally described as "Moderately Practiced." This implies that while efforts are being made to address customer-related risks, such as adapting to shifting customer expectations, there is room for improvement in the effectiveness and consistency of these practices.

Strategies for mitigating business risks in the supply chain of the retail gas industry. (Multiple responses).

No.	Strategies	Frequency	Rank
1,	Maintain relationships with multiple suppliers so that we don't rely too much on just one, and if one supplier has a problem, it won't affect us as much.	40	1
2,	Make sure we have enough stock but not too much by managing our inventory well. This helps us avoid running out of stock when there are problems with the supply.	39	2
3.	Create clear agreements with our suppliers to say what we expect from them and what happens if they don't meet our expectations.	38	3
4.	Use smart ways to predict how much of something we'll need in the future. This helps us plan better and make our supply chain work more smoothly.	19	10

5.	Find the most important things we need for our business and make sure we have backup plans in case something goes wrong with getting them.	29	7
6.	Use technology like special software, devices that connect to the internet, and a special kind of record-keeping system to help us see where our supplies are, know where they came from, and make things work better in our supply chain.	27	8
7.	Check regularly to see if our suppliers are doing a good job and if they can still provide what we need. This helps us avoid problems before they happen.	21	9
8.	Have places where we get our supplies from in different areas, so if there's a problem in one place, we can still get what we need from somewhere else.	30	6
9.	Work closely with the people and companies we work with to make sure we all know what's happening and help each other deal with risks.	37	4
10.	Make strong backup plans and find other places to get what we need quickly if something unexpected happens. This helps keep our business going and makes sure our customers don't have big problems.	32	5

The highest among the top 10 Strategies employed by respondents for mitigating business risks in the supply chain of the retail gas industry is the strategy which is to “Maintain relationships with multiple suppliers so that we don't rely too much on just one, and if one supplier has a problem, it won't affect us as much” (n=40, rank 1). Which means that maintaining relationships by the respondents with multiple suppliers is crucial for diversifying risk in the supply chain. By not relying excessively on a single supplier, a company can mitigate the impact of any issues or disruptions that may arise with one supplier.

The second top ranked strategy practiced by the respondents as indicated in the study is the number 2, “Make sure we have enough stock but not too much by managing our inventory well. This helps us avoid running out of stock when there are problems with the supply” (n=39, rank 2). indicates that this approach involves efficient inventory management to ensure sufficient stock availability without excessive tying up of capital. By managing inventory effectively, businesses can mitigate the risk of running out of stock during supply chain disruptions, thereby safeguarding their operations and customer satisfaction.

The 3rd highest-ranked strategy, "Create clear agreements with our suppliers to say what we expect from them and what happens if they don't meet our expectations" (n=38 rank 3). Indicates that respondents prioritize establishing transparent and enforceable contracts with suppliers. This approach suggests that respondents recognize the importance of clarity and accountability in supplier relationships. By defining expectations and consequences upfront, businesses can minimize misunderstandings, disputes, and delivery delays.

Part 4. Relationship between the socio demographic profile of the respondents and the practices for mitigating business risks in the supply chain of the retail gas industry

Correlations					
		Adaptive Capacity	Environment	Emergence	Adaptation
Years of Operation	Pearson Correlation	0.061	0.197	0.214	0.023
	Sig. (2-tailed)	0.675	0.171	0.135	0.873
	N	50	50	50	50
Ownership	Pearson Correlation	0.153	0.167	0.184	0.099
	Sig. (2-tailed)	0.29	0.246	0.2	0.493
	N	50	50	50	50
Number of employees	Pearson Correlation	0.097	0.227	0.14	0.101
	Sig. (2-tailed)	0.502	0.113	0.331	0.485
	N	50	50	50	50
** Correlation is significant at the 0.01 level (2-tailed).					

As shown in the table, years of operation is not correlated with number of employees (p-value 0.478 > 0.01 level), adaptive capacity (p-value 0.675 > 0.01 level), environment (p-value 0.171 > 0.01 level), emergence (p-value 0.135 > 0.01 level), and adaptation (p-value 0.873 > 0.01 level). The null hypothesis is “accepted”. It indicates that there is no significant relationship between the years of operation and the factors of number of employees, adaptive capacity, environment, emergence, and adaptation in mitigating

business risks within the supply chain of the retail gas industry. Essentially, the duration of operation does not have a notable impact on these specific aspects of risk mitigation strategies.

Additionally, Ownership is not correlated with the adaptive capacity (p-value $0.29 > 0.01$ level), Environment (p-value $0.246 > 0.01$ level), emergence (p-value $0.2 > 0.01$ level), and adaptation (p-value $0.493 > 0.01$ level). The null hypothesis is “accepted”. The lack of correlation between ownership and adaptive capacity indicates that ownership does not significantly affect the ability of individuals or entities to adapt to changes, challenges, or risks in their environment. Similarly, the non-correlation with the environment indicates that ownership status does not have a significant impact on the circumstances, objects, or conditions that surround individuals or organizations.

Moreover, the lack of correlation with emergence indicates that ownership status does not influence the appearance of complex behaviors or properties that emerge from interactions within systems or organizations. Additionally, the absence of correlation with adaptation indicates that ownership does not play a significant role in the ability of entities to adjust to changing circumstances or environments.

Furthermore, Number of employees is not correlated with adaptive capacity (p-value $0.5012 > 0.01$ level), environment (p-value, $0.113 > 0.01$), emergence (p-value $0.331 > 0.01$ level), and adaptation (p-value $0.485 > 0.01$). thus, the null hypothesis is “accepted”. This implies that there is no statistically significant relationship between the number of employees and these factors, indicating that variations in workforce size do not significantly impact adaptive capacity, environmental conditions, emergence of complex behaviors, or adaptation to changing circumstances or environments.

In summary, the null hypothesis that "there is no relationship between the socio-demographic profile of the respondents and the practices for mitigating business risks in the supply chain of the retail gas industry" is "accepted." This implies that, based on the analysis conducted, there is no statistically significant evidence to reject the null hypothesis.

Part 5. Proposed plan of activities to mitigate business risk in the retail gas industry based on the findings of the study

Rationale: Having a well-defined plan of activities is essential for effectively mitigating business risks in the retail gas industry, ensuring continuity, resilience, and sustainable growth.

Area of concerns	Activities	Persons involved	Time-frame	Outcome
Robust plans to manage disruptions effectively within supply chain infrastructure	Develop Contingency Plans and Risk Management Strategies: Create detailed contingency plans outlining steps to be taken in various disruption scenarios. Identify potential risks and implement risk management strategies to mitigate them.	Operation managers	Ongoing	Enhanced resilience and minimized impact of disruptions.
Regulatory changes profoundly influence industry's dynamics, necessitating continuous adaptation and flexibility	Update Compliance Protocols in Response to Regulatory Changes: Continuously monitor regulatory changes and update compliance protocols and procedures accordingly. Ensure that all operations align with the latest regulations to avoid disruptions and legal issues.	Operation Managers	Ongoing	Timely compliance and proactive adjustments to regulatory changes.
Emerging disruptions or advancements shape industry landscape, requiring agile responses to maintain resilience and competitiveness.	Implement Innovation Monitoring Systems: Establish systems to monitor emerging trends and disruptions in the industry. Stay agile by identifying opportunities for innovation and adapting processes accordingly to maintain competitiveness.	Operation Manager	Ongoing	Swift identification of emerging trends and proactive adaptation strategies.
Adaptation strategies are integral in managing sudden disruptions, enabling swift recovery and	Establish Crisis Management Protocols: Develop clear crisis management protocols outlining roles, responsibilities, and actions to be taken in the event of sudden	Operation Managers	Ongoing	Rapid recovery and sustained operational efficiency

maintenance of supply chain continuity.	disruptions. Conduct regular drills to ensure that all stakeholders are prepared to respond swiftly and effectively.			despite disruptions.
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IV. Conclusion

The research indicates that the most substantial segment of participants consists of family-owned businesses operating for 5 to 10 years, with 5 to 10 employees.

The supply chain in the retail gas industry of Nueva Ecija demonstrates a strong emphasis on adaptive capacity, environmental practices, addressing emerging risks, and adaptation. Adaptive capacity practices are widely implemented, indicating proactive risk mitigation efforts. Environmental practices are highly practiced, showing a focus on addressing environmental impacts. The industry also appreciates the importance of addressing emerging risks and disruptions, suggesting proactive measures. Furthermore, businesses actively practice adaptation, ensuring compliance with regulations and making operational adjustments to navigate unforeseen disruptions.

Mitigating supply chain risks is crucial for ensuring smooth operations and minimizing disruptions in business operations. One effective strategy is to diversify the supplier base, as highlighted in resources like Inbound Logistics, emphasizing the importance of engaging with multiple suppliers to reduce reliance on a single source. Additionally, adjusting inventory management strategies can help in maintaining optimal stock levels without tying up excessive capital. Other strategies include developing contingency plans, gaining better visibility into the supply chain, and quickly reacting to changes. Embracing digital technologies, such as advanced analytics, is also essential for risk mitigation. Furthermore, investments in technologies can enhance supply chain resilience, as highlighted by Purdue Online. Implementing these strategies collectively contributes to a more resilient and adaptable supply chain, vital for navigating uncertainties and disruptions effectively.

The null hypothesis, which posits that there is no relationship between the socio-demographic profile of respondents and the practices employed to mitigate business risks in the retail gas industry's supply chain, is accepted. This indicates that the analysis yielded no statistically significant evidence to refute the null hypothesis. Thus, factors like the duration of operation, ownership structure, workforce size, or other socio-demographic attributes of respondents do not significantly impact the risk mitigation practices adopted by stakeholders in the retail gas industry's supply chain.

Based on the study's findings, the researcher has developed a proposed plan comprising various activities aimed at mitigating business risks within the retail gas industry. This plan is formulated considering the identified risk factors and their potential impact on the industry's operations. The activities outlined in the plan are tailored to address specific vulnerabilities and enhance resilience against potential threats. By implementing this proposed plan, retail gas businesses can proactively manage risks and minimize their adverse effects on operations. The activities may include but are not limited to, enhancing supply chain resilience, implementing robust inventory management practices, fostering strategic partnerships with multiple suppliers, and developing contingency plans for various scenarios. Additionally, the plan may incorporate measures to improve operational efficiency, optimize resource allocation, and leverage technological solutions for risk monitoring and mitigation. Overall, the proposed plan aims to equip retail gas industry stakeholders with effective strategies to navigate challenges and sustain long-term success in a dynamic and competitive environment.

V. Recommendation:

To enhance supply chain resilience in the retail gas industry of Nueva Ecija, it is recommended that **company management and operational teams** develop and implement comprehensive contingency plans. These plans should include detailed steps for responding to potential disruptions and proactive risk management strategies to mitigate their impact. Regular assessment of potential risks is vital to ensure preparedness.

Additionally, it is essential for **compliance officers and legal teams** to continuously monitor regulatory changes and promptly update compliance protocols and operational procedures. This will help ensure that all activities align with the latest regulations, thereby avoiding potential disruptions and legal complications.

To remain competitive and adaptive, **industry leaders and innovation managers** should establish robust systems for monitoring emerging trends and industry disruptions. This involves identifying opportunities for innovation and integrating them into existing processes to maintain a competitive edge.

Finally, **crisis management teams** should develop clear crisis management protocols that define roles, responsibilities, and specific actions to be taken during sudden disruptions. Regular drills and training exercises should be conducted to prepare all stakeholders for swift and effective responses to emergencies.

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