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Cold warehousing services from the perspectives of logistics providers: the mediating role of cost and organizational readiness

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Keywords: intention to provide cold warehousing services, TOE framework, mediator, smart PLS 4, logistics service provider.
Abstract: Despite the importance of the cold supply chain in preventing food waste worldwide, there are only a limited number of cold chain providers in Malaysia. This study investigates the factors influencing the intention to provide cold warehousing service logistics providers in Malaysia. Employing a purposive sampling method, data were gathered via an online survey of logistics companies in Malaysia. 184 usable datasets were valid for further analysis. Owing to concerns regarding predictive purposes, structural equation modelling with SMART-PLS 4 was applied to test the hypotheses of this study. The analysis found all direct hypotheses were supported. The relationship between CEO innovativeness and intention, and government support toward intention, is positively mediated by organizational readiness. Meanwhile, cost failed to mediate the relationship between CEO innovativeness and intention. The study developed a new model with two mediators for a better understanding of the factors influencing the intention to provide cold warehousing services in Malaysia from the perspective of logistics providers. The findings will provide meaningful information for the government to craft a better policy to enhance the number of cold service providers.

1 Introduction

One-third of the 4 billion tonnes of food produced annually worldwide is wasted due to supply chain failures from farms to retailers and loss of final consumption in restaurants or at home. The number of food waste is estimated to grow annually. Food waste is a moral issue because almost 12 per cent of the population in the world is suffering from hunger. Lack of cold storage lead to food waste problems which are prone at developing nations. Temperature changes occurring in the cold chain lead to economic losses as well as lost market opportunities due to quality loss issues and export protocol deviations. Lack of cold storage is one of the major bottlenecks for an efficient and effective food cold chain. When capacity of cold storage is observed in secondary cities, it is often of poor quality, with variable or high temperatures, temperature indicators rather than digital, no shelving, possibly no pallets, lack of entrances, insulation, loading docks, and mechanization [1]. Therefore, cold warehouse is needed not only to preserving cold products, but to ensure the products safety and quality before it arrived at the hand of end users.

Cold storage is vital to perishables and respective industries like Halal. According to [2], the cold storage market was valued at $89.32 billion in 2018 and is projected to reach $217.59 billion by 2026, growing at a compound annual growth rate of 11.71% from 2019 to 2026. The total capacity of refrigerated warehouses worldwide was 719 million cubic meters in 2020. Factors driving growth include online grocery sales, flat-rate meal services, consumer preference for fresh and perishable goods, and the rise of pharmaceuticals requiring special storage. Growth is seen at a compound annual growth rate of 11.71% from 2019 to 2026. A major challenge for the industry is that demand for cold storage is outstripping supply. In the United States (US), for example, the supply of refrigerated warehouses is outdated and the construction of modern facilities lags behind demand. Also, more than 78% of US cold storage were built before the year of 2000,

suggesting that modern cold storage is often under-resourced. In Malaysia, the relatively high growth of refrigerated storage compared to refrigerated transportation can be attributed to the establishment of new facilities in free trade zones by industry players. This is because the investors prefer to invest in cold storage as it is a safer long-term investment despite the higher investment cost. Additionally, there is a seasonal spike in demand, especially during the fasting month of Ramadan.

Nowadays, cold warehouse is also needed to improve the value chain especially within developing country like Malaysia. Cold storage are fundamental aspects to prevent deterioration of the product quality. The demand for frozen foods such as frozen meat, ready meals, fruits, vegetables, cookies, fast foods, and bakery items is on the rise due to the rise of households, markets and retailers. This trend is also impacting the Malaysian logistics market. The cold chain market in Malaysia can be segmented into five major categories: fruits & vegetables, bakery & confectionery, dairy & frozen desserts, seafood, and pharmaceuticals. Due to the growing demand for perishable food, development of logistics hub and increasing demand for Halal products, the Malaysian cold chain market is anticipated to grow significantly. Halal cold chain products require sea/airport complex while [3] stated that an appropriate logistics infrastructure such as cold warehouse and other cold chain facilities also needed for managing halal supply chain in Malaysia. Malaysia has established itself as a hub for the halal industry, driving demand for cold storage. However, [4] stated that the adoption of cold chain is low among developing country. Moreover, [5] stated that only few cold chain providers exist in Malaysia makes this industry is a niche area and it can be seen from the small number of registered cold chain operators in the Malaysia Logistics Directories. Nonetheless, logistics providers in Malaysia remain uninterested to provide cold warehousing services despite the high demand and potential. Therefore, the study would discover factors influencing the intention to provide cold supply chain services among logistics providers in Malaysia.

Various previous study was discussing cold chain in the context of food safety, temperature break and condition, last mile delivery [6], supplier selection [7], monitoring application [8], and service innovation, however not many studies conducted to investigate the service innovation from the perspective of service providers. The purpose of this study was to expand the cold chain literature by understanding the considerations of cold storage providers before offering relevant services in developing countries, including Malaysia. As a result, this study could be reference by service providers within developing countries prior to their consideration for becoming one of the cold warehouse service providers. By applying a quantitative approach based on the TOE framework, the current study sought to fill gaps in the existing literature by identifying factors that contribute to Malaysian logistics providers' intention to provide cold warehouse services. Moreover, despite the importance of CEO innovativeness and cost, this relationship was not thoroughly tested in the supply chain studies especially for the adoption cold warehousing services. On top of that, even government support is fundamental to encourage organization adoption of new technology or new approach, lack of study looking at this variable with the organization readiness. While there is no agreed-upon accepted conceptual framework and/or reference model for use by academics and practitioners working in the industry of cold chain, conceptual/reference models abound in other fields, but cold supply chains have not received similar attention [9]. The cold chain is thus fertile ground for further work. Nevertheless, cold chain LSP in emerging market is an appropriate context for generating new insights on the service innovation research. This makes the service innovation like cold warehousing adoption within developing countries is still promising topic in research.

The study contributes in numerous ways. First enriching literature in cold warehousing services adoption from the perspectives of service providers. Second, the study introduces the relationship between CEO innovativeness and cost. Third, exploring the relationship between government support and the organizational readiness, which is very limited in the adoption literature, and scarce of studies were look at the relationship between them. Fourth, lack of mediation analysis in the TOE framework, but, the studies introduced two mediators which is cost and organization readiness. The findings of the study could be applied to various countries who has similar characteristics with Malaysia.

2 Literature review

This section discusses related literature, develops hypotheses, and elucidates the research framework.

2.1 Cold warehouse

Perishable products are prone to degradation as soon as they're harvested. Therefore, a proper post-harvest handling are essentials for maintaining the quality and prolonging its shelf life. Thus, cold storage is needed to fill the role. In cold warehousing, the most important design elements are low temperature, temperature uniformity across the room's cold compartment, temperature stability with minimal fluctuations, good air distribution to maintain temperature uniformity, minimal temperature to avoid dehydration, air circulation, and minimal air inflow to minimize fluctuations.

2.2 The technology-organisation-environment (TOE) framework

The TOE Framework describes how organizational context influences the adoption and implementation of innovations in three different ways [10]. The TOE framework explains that three different elements of a firm's context influence adoption decisions comprises

technological context, organizational context and environmental context. The technological context includes all technologies that is relevant to the firm either already in used or are still available in the market. The Organizational context refers to company characteristics and resources. While environment context embraces the structure of the industry. In this study, cost is representing the technological context, CEO innovativeness and organizational readiness representing organizational context, while environmental context is represented by government support. Because the TOE framework incorporates both human and non-human factors into one framework, TOE provides a more comprehensive view of technology adoption.

2.2.1 Cost

Cost can be referred to the expenses that a firm incurs to sustain cold warehousing which has a significant influence on executive's decision making [11]. The high initial cost to adopt cold warehousing includes the refrigeration system, acquiring new building or upgrading the existing building that suitable for cold storage, systems monitoring for temperature control, and backup power systems to prevent power outage. Nevertheless, the running cost of cold warehousing also very high due to the high energy consumption for the refrigeration system and also the indirect cost such as hiring new employees or training existing staffs. High installation and operation cost preventing efficient cold supply chain in developing country. High electricity bills have been repeatedly pointed out as a problem for cold storage and electricity costs are higher in the remote regions than in the capital [1]. This is why [12] confirmed that cost is the only variable that significantly act as barrier to Halal warehouse adoption. Previous studies confirmed that cost has negative effect toward the intention to adopt new technology. Thus, the study proposed that:

H1: Cost negatively influence the intention to provide cold warehousing services.

2.2.2 Organization readiness

Organizational readiness can be defined as the accessibility of organizational resources required for deployment of cold warehouse [13] in term of financial, manpower and technology resources. Organizational readiness could be limited by technology and financial resources. Prior for cold warehouse adoption, company definitely need to have expertise and essential knowledge to properly manage the adoption. Preparation in financial, human resources and technology may determine the level of organization readiness towards the cold warehouse adoption. Previous study by [14] confirmed that OR has positive effect on intention to adopt supply chain analytics system. Postulated to that, the study proposed:

H2: Organizational readiness positively influence the intention to provide cold warehousing services.

2.2.3 CEO Innovativeness

CEO is an entrepreneur figure who is crucial in determining the innovative attitude of a firm which openness to follow new ways and methods [15]. CEO's innovativeness is the extent to which a CEO is willing to actively adopt new management techniques and technologies to improve the organization. CEO are supposed to have power in influencing the firms' strategies and related performance. Thus, CEO can alter the direction of a company either to object or support such decision on technology adoption consequently allocating necessary resources. CEO are the key decision makers whose decision can influencing current and future activities of firms'. This is because CEO can drive their firm to adopt strategies that deviates from industry norms in order to become more innovative by communicating and implementing compelling visions. [16] mention that CEO innovativeness has a positive association with innovation adopted over last few years, this is because they are not only risk-takers, receptive towards new technology and view thing differently, they are also consistence and visible in committing funds and resources for new technology.

Innovative CEO can alter the effect of cost barrier towards cold chain adoption. The CEO can overturn the cost barriers by finding financial solution to support the cold chain adoption. This is aligned with [15] where innovator CEO would prefer solutions that change the structure in which the problem is embedded. Therefore, innovative CEO would have a negative influence towards cost barriers in providing cold warehousing services. Those innovative CEO surely can give effect towards organizational readiness by giving instruction either to allocate necessary resources prior to cold warehouse adoption. Since CEO is the ultimate decision maker in a firm, this makes the CEO can direct the firm readiness to adopt cold warehouse. Thus, the study proposed that:

H3: CEO innovativeness negatively influence cost of providing cold warehousing services.
H4: CEO innovativeness positively influence organizational readiness.

2.2.4 Government support

Government support refers to the extent to which a company is affected by government activity that stimulates the cold chain industry by creating basis and values needed for adoption [17]. Support from the government can be represented as the nationalized legislation, tax refund compliance, industrial standards, hardware infrastructure, or even media publication. Support from government could provide favourable environment thus removing barriers to adopt cold warehouse. Governments can encourage companies for innovation adoption, by supporting firms through the appropriate imposition of tax laws and

beneficial firm development policies. When support is ample, most probably the cold warehouse adoption tends to be quick. Because of the ease in legislative and financial incentives, the burden of an organization can be reduced and increasing the readiness towards cold warehouse adoption. Thus, the study proposed that:

H5: Government Support positively influence organizational readiness.

2.2.5 Mediator (Cost and OR)

Mediation commonly used as contributions for studies in social science. In an emerging market, costs for cold chain adoption is higher and riskier due to the inadequate infrastructure and chronic shortage of resources. More investment on equipment, human resources and IT facilities, bears higher operations costs and are more vulnerable to institutional environment, for the involvement in cold chain logistics services, [18] stated that cold chain industries are facing numerous challenges including high cost where it accounts for 30% of the global energy consumption. It was believed that cost could mediates the relationship between CEO innovativeness toward the cold warehouse adoption. Innovative CEO tend to favours for technology adoption. However, due to the high initial and running cost of cold warehousing, the is a likelihood that CEO will turn down the adoption. The financial cost could be negative determinant for company affordability to adopt cold warehouse. However, the characteristics of innovative CEO can alter the willingness of such company to adopt technologies for improving the organization.

Besides, this study is proposing that the organizational readiness could be mediated by CEO innovativeness and government support. This means that the openness of CEO to adapt new technology and the encouragement by the government in the form of legislation and financial stimulation could influence the readiness of an organization to adopt cold warehouse. The CEO generally has full control over organization's financial and human resources which could be used to support for information gathering regarding their competitors as well as to allocating requisite financial resources for cold warehouse investment. Based on [15], technology adoption consideration by the CEO happens when company has achieved organizational readiness for its financial and organizational resources in order to maintain or gain their competitive edge.

According to, the government support as administrative and financial incentive promoting the introducing of new technology to the company. This support allowing soon to be cold warehouse providers to prepare their readiness towards financial and human resources. Government holds a significant role in determining the regulations through facilities and governing work pattern which impacting the company readiness to adopt cold warehouse. Thus, government can use their tools and policies to ease the financial and human resources aspect in serving readiness of cold warehouse adopters. Figure 1 illustrates the research framework of the study.
Postulated to that, the study proposed:

H6: Cost negatively mediates the relationship between CEO innovativeness and intention to provide cold warehousing services.
H7: Organizational readiness positively mediates the relationship between CEO innovativeness and intention to provide cold warehousing services.
H8: Organizational readiness positively mediates the relationship between government support and intention to provide cold warehousing services.

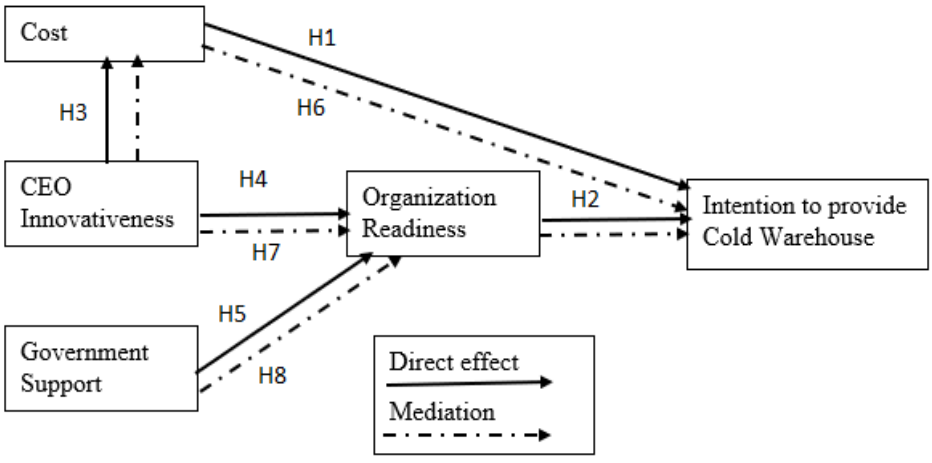

Figure 1 Research framework

3 Methodology

Due to unit of analysis of the study is at the organization, thus, only managers from logistics providers who not yet providing cold warehousing services are valid respondents of the study. To ensure respondents' validity, a filter question "My company offer cold warehousing services" was added in the beginning of the questionnaire.

3.1 Research instruments

The measurements of the study were adopted from established literature in supply chain studies. CEO innovativeness was adopted from [19] cost. Organization readiness and intention from [12] and government support from [20]. To address the common method bias using the procedural method, the study employed different anchor scale [21] to measure the endogenous variables (1-5) and exogenous variable (1-7).

3.2 Sampling method and data collection

Since the population of the study in unknown, the study employed the non-probability sampling method . Since the study focus on the non-provider of cold warehousing services, thus the study will rely on the purposive sampling method. Based on the list of logistics provider acquired from the Malaysia Logistics Directory, the study contacted all the companies to ensure their willingness to respond to the study. Among 645 companies, 420 were agreed to respond, thus, the study proceed the questionnaire via email. Out of 420 emails, only 195 were responded completely. After through scanning, only 184 were valid respondent for the study.

Since the study focus on the predictive purpose, Smart Partial Least Squares (PLS) 4 [22] was applied using a structural equation modelling (SEM) approach. As proposed by [23], while using the Smart PLS software, the must ensure that the sample size is sufficient to test the research model. Employing the G*Power, with 80% power, medium effect size and p = 0.05, proposed by [24] with two predictors in the research model, the minimum sample size is 68. Thus, with 184 sample of the study, it is confirmed that sample size was not an issue for the study.

Out of 184 respondents of the study, majority of the respondents were assistant managers (52.7%). Moreover, 60.3% of them is having less than 5 years of experience in the current job positions, 56% of the respondents were Diploma holders, 60.3% of the respondents were male. 56% or most of the logistics providers involve in the study are from large size, and interestingly, 73.4% of them are local companies. Most corporations (74.5%) were established above 9 years. More than half (51.6%) of the companies focused on handling food products.

4 Analysis

4.1 Common method bias

Since the data were collected from a single source, it might lead to common method bias. The study used procedural method by applying different anchor scales to measure exogenous and endogenous variables [21]. For statistical method, following [25] the study used a full-collinearity testing to remedy the CMB. Table 1 illustrates the results which shows that all the VIF values were lower than 3.3 [25], thus suggesting the CMB was not severe for the study.

Table 1 Full collinearity

Construct	CEO	COSTS	HR	ITTN	GS
VIF	1.994	1.332	2.524	2.088	1.535

4.2 Measurement model

The established the measurement model, two types of validities must be established; convergent validity and discriminant validity. The convergent validity will be established if the loading and average variance extracted (AVE) is ≥ 0.5 and the composite reliability (CR) is ≥ 0.7. [26]. The analysis shows that all the loading, AVE and CR were higher than acceptable threshold value, confirming that the convergent validity has been established for the study. Table 2, illustrates the value for loading, AVE and CR of the study. On top of that, using the hetro-trait monotrait ratio, all the values were lower than 0.85 as suggested by [27], thus confirming the study also having no problem to establish the discriminant validity.

Table 2 Convergent validity

Construct	**Item**	**Loading**	**CR**	**AVE**
CEO Innovatiness	CEO1	0.868	0.944	0.808
	CEO2	0.912		
	CEO3	0.885		
	CEO4	0.930		
Cost	COSTS1	0.807	0.846	0.583
	COSTS2	0.811		
	COSTS3	0.827		
	COSTS4	0.583		
Intention	ITTN1	0.987	0.993	0.979
	ITTN3	0.990		
	ITTN5	0.991		
Government	GS1	0.923	0.951	0.866

Support	GS2	0.934		
	GS3	0.936		
Organizational	OR1	0.862	0.871	0.771
Readiness	OR2	0.809		
	OR3	0.895	0.943	0.893
	OR4	0.927		

Table 3 Discriminant validity (HTMT)

Construct	CEO	COSTS	GS	ITTN	OR
CEO					
COSTS	0.530				
GS	0.455	0.415			
ITTN	0.627	0.378	0.457		
OR	0.679	0.434	0.629	0.728	

4.3 Structural model

To test the hypotheses, develop from the research framework, the study carried out the bootstrapping with 5000 iterations to calculate path co-efficient. The hypotheses will be claim as supported if the beta value is similar with the direction of hypothesis, T-value ≥ 1.645, P value ≤ 0.05 and there is no zero value between the lower level (LL) and upper level (UL) of the confidence interval [23]. Prior to that, the multi-collinearity among the construct must be assessed. The study will be freed from collinearity if the variance inflated factor (VIF) were lower than 3. 3. Table 4 shows that all the VIF values were lower than 3.3, confirming that collinearity was not a threat in the dataset.

All the direct hypotheses of the study were supported. For the H1, the findings suggested that COST→ITTN (β= -0.118, P < 0.05) thus, confirming the negative effect of cost on ITTN, and supporting the H1 of the study. The study proposed OR to has a positive relationship with ITTN for the H2. With (β= 0.641, P < 0.001), thus confirming that OR positively influence ITTN, thus supporting the H2 of the study. For the relationship between CEO→ COSTS (β= -0.477, P < 0.001), the analysis shows that the CEO innovativeness negatively influence cost, thus supporting the H3. For another direct analysis related to the CEO innovativeness, the study hypothesized that CEO positively affect the OR. The analysis shows the evidence of the positive relationship between CEO□OR (β=0.460, P < 0.001), thus supporting the H4. As the last hypothesis for the direct effect, the GS was hypothesized to has a positive relationship with OR. With (β= 0.382, P < 0.001), it is confirmed that GS has a positive relationship with OR, hence H5 was supported.

From the research model, there are three endogenous variables for the study. 22.8% variance for cost was explained by CEO, 48.1% variance for OR was explained by CEO and GS, meanwhile 50.6% variance of ITTN was explained by OR and COST. As the hypotheses were supported, it is crucial for the study to report the effect size (f^2). Effect size was categorized by [28] with small (0.02), medium (0.15) and large (0.35). H1 and H3 have a medium effect size, meanwhile H2 and H4 were having a large effect size, meanwhile H5 only managed to has a small effect size. Table 4 illustrates the analysis for the direct hypotheses of the study.

To enhance the predictive power, the study suggested COST and OR as mediators within the framework. Using the [29], to bootstrapping the indirect effect, and the analysis found that cost was not having a mediation effect for the relationship between CEO and ITTN (β= 0.056, P = 0.051, LL -0.001, UL 0.112), thus H6, the first hypothesis for mediation was unsupported. As expected, OR was found to positively mediates the relationship between GS and ITTN (β= 0.245, P < 0.001; LL=0.166, UL = 0.332), thus supporting the H7. Lastly, OR also was found the positively mediated the relationship between CEO and ITTN (β= 0.295, P < 0.001, LL = 0.202, UL = 0.390), thus supporting the H8. Table 4 and figure 2 illustrates the summary of findings for the hypothesis testing.

Table 4 Hypotheses testing result

Hypothesis	Relationship	Beta	SE	T Value	P value	LL	UL	VIF	F2
H1	COST→ ITTN	-0.118	0.072	1.645	0.050	-0.236	-0.001	1.159	0.023
H2	OR → ITTN	0.641	0.060	10.757	0.001	0.532	0.732	1.159	0.684
H3	CEO→COST	-0.477	0.061	7.775	0.001	-0.584	-0.379	1.000	0.295
H4	CEO → OR	0.460	0.076	6.036	0.001	0.330	0.579	1.215	0.353
H5	GS →OR	0.382	0.066	5.758	0.001	0.278	0.495	1.215	0.243
H6	CEO → COSTS → ITTN	0.056	0.034	1.643	0.051	-0.001	0.112		-
H7	CEO → OR → ITTN	0.295	0.058	5.071	0.001	0.202	0.390		0.087
H8	GS → OR → ITTN	0.245	0.051	4.841	0.001	0.166	0.332		0.060

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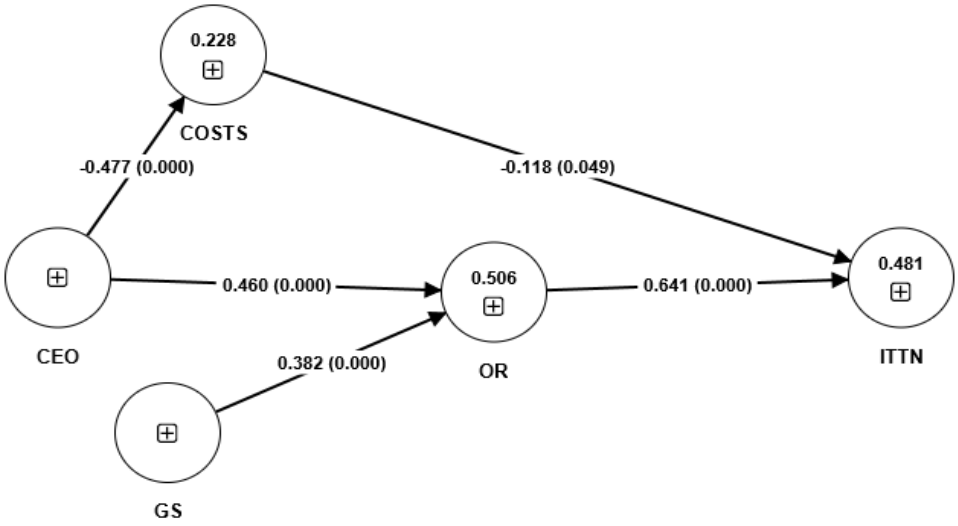

Figure 2 Structural model

4.4 PLS Predict

As the study concern on predictive purpose, PLS predict analysis was performed to measure the predictive relevance. Firstly, the value of Q^2 must be > 0, before looking at the Root Mean Square Error (RMSE) from PLS modelling and Linear Modelling (LM). The analysis will indicate the errors for each modelling techniques. Thus, if the value from PLS RMSE were lower than LM RMSE, indicating lower error, thus producing higher predictive power. As proposed by [30], if the result from PLS RMSE – LM RMSE shows all negative values, the model has strong predictive power; if majority was negative, moderate predictive power, if minority was negative, low predictive power, while all positive value indicating of the prediction was not confirm. Table 5 shows that for Cost an OR, majority of the items produce negative values, indicating for both variables have a medium predictive power. Meanwhile for ITTN, since the result shows all negative value, suggesting the model for ITTN has a strong predictive power.

Table 5 PLS predict

Item	Q^2predict	PLS-RMSE	LM_RMSE	PLS-LM	Decision
COSTS1	0.132	0.802	0.804	-0.002	Medium
COSTS2	0.083	0.729	0.752	-0.023	
COSTS3	0.212	0.874	0.895	-0.021	
COSTS4	0.015	1.007	0.96	0.047	
ITTN1	0.361	1.572	1.598	-0.026	Strong
ITTN3	0.348	1.526	1.537	-0.011	
ITTN5	0.37	1.522	1.529	-0.007	
OR1	0.45	0.786	0.791	-0.005	Medium
OR2	0.251	0.872	0.881	-0.009	
OR3	0.397	0.824	0.8	0.024	

5 Discussion

The study aims to unearth factors influencing the decision to provide cold warehousing services among the logistics providers in Malaysia. To achieve the research objectives, the study employed the TOE framework, by providing five direct hypotheses, and three mediations as contribution for the study. Besides enriching the limited literature in cold supply studies, especially in warehousing services from the perspectives of logistics providers, the findings of the study also provides meaning information for many parties involves in the industry.

For the first hypothesis, the study found that cost is negatively influence the intention to provide cold warehousing services. Higher cost to provide will lower the intention to become cold warehouse service provider. The finding supported [12] in their adoption of Halal warehouse studies. Since cost is a crucial factor faced by the current logistics providers, thus they should come out with creative and meaningful solution, since cold warehousing services has a bright future and lower competition in Malaysia [3]

Organizational readiness was found to have a positive effect on the intention to provide cold warehousing services. The study portrays that higher readiness will increase to intention to provide cold warehousing services. The finding is supported by [14] who found that organizational readiness positively influences the adoption decision. The finding signalling that, while the

organization is ready in term of human resource and financial, they also will have a higher intention to become a provider for cold warehousing services. Thus, parties who could boost the organization readiness such as higher institution to provide qualified human capital, and financial institution to back up the arrangement to become cold warehousing services in near future since increasing their numbers will be helpful to many parties including themselves.

CEO innovativeness also has a favourable relationship with cost of adoption. Higher CEO innovativeness will lower their cost, thus supporting the negative relationship between them. The finding is similar with [15] who claimed that innovative CEO will provide a good solution to solve the firm limitation. Thus, hiring an innovative CEO not only good for the company's image, but also will reduce the operation cost for the organization.

CEO innovativeness also found to have a positive relationship with organizational readiness. The finding was supported by previous study by [16] who found that CEO innovativeness positively affect organization future behaviour. This finding indicates that high CEO innovativeness will produce higher intention to adopt new technology in their business activities. Hence, appointing innovative CEO not only will lowering the cost, but also escalation their organization intention to adopt new way of conducting business, such as providing new diversification from current business from conventional logistics provider, to become a cold warehousing provider.

Another supported hypothesis with the organizational readiness is government support. The findings supporting the idea of [31] who suggested that the government should provide favourable environment which will eliminating barriers to provide cold warehousing services. The study agreed with [32], government support could be implemented by imposition of tax laws and many other financial assistants to encourage companies to improve their services for the sake of the gross domestic products and also delighting the community's requirements.

For mediation analysis, the study found cost did not mediate the relationship between CEO innovativeness and intention to provide cold warehousing services. It shows that, if the logistics providers truly believed benefits will outweigh the cost, whatever cost, they are willing to bear for the sake of future benefits. Even the demand for the cold warehousing services in increasing, and lack of competitors in the business, however, the cost needed to penetrate the market is too big for them, thus justify why the cost did not mediate the relationship between CEO innovativeness and intention to provide cold warehousing services.

Organization readiness positively mediates the relationship between CEO innovativeness and government support toward intention to provide cold warehousing services. Thus, indicating the important of organizational readiness in supporting the decision to provide cold warehousing services among logistics providers in Malaysia. The findings strengthen the idea of the importance of organizational readiness prior to organization to explore new business in their organization. Thus, if they are willing to offer cold warehousing services, by all means, the human resource and financially must be wealthy enough since it requires a lot of works and money to be part of the cold warehousing providers.

5.1 Theoretical contribution

Present study has successfully enriching literature in TOE models in the perspective of cold warehousing service provider. The exploration of empirical confirmation of mediation analysis for CEO innovativeness and GS by OR has managed to contributes in the TOE model. This result can be replicates and further develop in other settings. Despite the unsuccessful of establishing mediation analysis between CEO innovativeness and cost towards intention, this means that there's still an opportunity for other research to be conduct to confirming this theory further. The non-confirmation maybe due to the unsuitable context or setting to test the idea.

5.2 Practical contribution

Discoveries in this study has predominant connotation for the development of cold warehouse industries especially within the developing countries. The practice of cold warehouse to upsurge the value chain benefiting every level within the channel echelon and perquisite the consumers. Enhancement in cold warehousing were expected to be and answer for the global foods waste morale issues. The results are useful for every stakeholder to consider their stands for promoting cold warehouse adoption. This could also be tools for managerial consideration to gain market share in this industry.

This model shows that CEO and the government play vital roles against the readiness of warehouse providers. CEO through their innovativeness must able to remedy any barriers in the form of financial and human resources. Whilst the government on the other hand must provide as much aids as possible in the form of tax reliefs and reducing unnecessary legislation [3]. By doing this, the promotion of cold warehouse supposes to succeed.

6 Conclusion

Results in this study has ascertain the key factors influencing the intention to adopt cold warehouse services which useful to improve the value chain towards consumers. Specifically, all five direct hypotheses were supported, whereas only one of the three proposed mediation hypotheses was unsupported. CEO innovativeness, GS and OR remains the contributors to cold warehouse adoption subsequently enriching the literature in both TOE model and also in cold warehousing. The investigation has proved that CEO innovativeness and GS can be mediated by OR towards the intention of service providers for considering to offer cold warehouse.

Knowledge in this study may become basis for CEO and government to find ways in promoting cold warehouse. CEO and government could steer the direction of company and industries through finding creative solution and preparing company to cold warehouse adoption.
Nevertheless, the mediation roles of cost were insignificant to change the view of CEO towards cold warehouse adoption. Despite the innovativeness of the CEO towards beneficial of cold warehousing, cost remains preventer towards any technology adoption. Thus, the decision to provide cold warehousing services is not solely dependent on organisational readiness or CEO innovativeness but also on technology and environmental factors in motivating logistics providers to offer cold warehousing services. Other parties, especially the government, should also assist in increasing the number of cold chain providers in Malaysia, which will not only benefit the logistics providers but also improve the quality of foods for citizens while reducing the waste amount in the country.

6.1 Limitation and recommendation

This study has several limitations which can endorses for further research. Only four variables were tested namely cost, CEO innovativeness, government support and organizational readiness in the model. It is suggested that more variables should be included in the framework for future development in this area. As for now, there's only two mediation variables were used which is cost and OR. Therefore, more mediation analysis should be included for further explaining the phenomenon of deficiency within cold warehousing.

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