学位論文全文に代わる要約
Extended Summary in Lieu of Dissertation

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学位論文題目：
Title of Dissertation

Transformation of Modern Retail Market in Indonesia: Consumers Choices, Small-scale Farmers' Participation and Sustainable Fruit and Vegetable Supply Chain Management
(インドネシアにおける現代小売市場の変革: 消費者の選択行動、小規模生産者の市場参加と持続可能な青果物サプライチェーン・マネジメント)

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Dissertation Summary

The retail landscape in Indonesia is transforming from a traditional to a modern retail format in response to supply factors (liberalized foreign investment and improved supply chain) and demand factors (income growth, urbanization, urban consumption, women in the labor force, changing lifestyle, and convenience) (Chowdhury et al., 2005). This trend is similar to other developing countries (Reardon et al., 2009), as indicated by the rapid increase in the share of modern retailers in food retailing at the expense of traditional shops and wet markets in China (Wang et al., 2009), Brazil (Mainville and Reardon, 2007), Kenya (Neven et al., 2009), Guatemala (Hernandez et al., 2007), Thailand (Schipmann and Qaim, 2010), and Vietnam (Mergenthaler et al., 2009). Supermarkets in Indonesia were first established in the 1970s (Natawidjaja et al., 2007), and since then their numbers have increased rapidly. In 2014, there were already more than 1362 supermarkets (a rise from 636 outlets in 1999), 269 hypermarkets (18 outlets in 1999), and 22,818 convenience stores and minimarkets (522 outlets in 1999) (Dyck et al., 2012; USDA GAIN Report, 2015). By 2014, the modern retail sector (supermarkets, hypermarkets, convenience stores, and minimarts) share of total grocery retail sales reached 16%, having increased from 5% in 1999, while traditional grocery retail share of total grocery retail sales decreased from 93% in 1999 to 83% in 2014 (see Table 1).

Table 1. Food retail sales and number of outlets in Indonesia

Retail sector[d]	1999 [a]		2004 [a]		2009 [a]		2014 [b,c]	
	Sales Millions $US	Outlets Number	Sales Millions $US	Outlets Number	Sales Millions $US	Outlets Number	Sales Millions $US	Outlets Number
Total food retail	31,466.00	2,134,892	45,686.00	2,207,739	52,383.00	2,568,479	99,186.88	2,555,474
Modern grocery retail								
Hypermarkets	256.00	18	940.00	34	1897.00	141	5423.30	269
Supermarkets	1235 .00	636	1852.00	695	2068.00	1162	3239.20	1362
Convenience stores/minimarkets	69.00	522	520.00	1435	1676.00	10,039	7366.10	22,818
Modern total	1560.00	1176	3312.00	2164	5640.00	11,342	16,028.60	22,449
Modern share of total sales (%)	4.96		7.25		10.77		16.16	
Traditional grocery retail	29,906.00	2,133,716	42,374.00	2,205,575	46,743.00	2,557,137	83,158.28	2,533,025
Traditional share of total sales (%)	95.04		92.75		89.23		83.84	

Source: [a] Dyck et al. (2012); [b,c] The Development Bank of Singapore (2015) and USDA GAIN Report (2015); [d] Other specialized stores are not included.

In parallel with rising income, urbanization, globalization, and the development of modern food retail markets, the behavior of consumers has also changed related to what, where, and when they purchase their food. The spread of supermarkets contributes to encouraging the shifting of Asian diets away from common grain staples and increasingly towards livestock and dairy products, fats and oils, and fruit and vegetables (Pingali, 2007). For example, in the food consumption data of Indonesian consumers (BPS, 2015), retail sales of food-grain staples compared with total food retail sales has been declining, from 33% in 1998 to 27% in 2014. On the other hand, retail sale shares have increased for livestock and dairy products (from 15% in 1998 to 17% in 2014), fish products (from 11% in 1998 to 14% in 2014), and fruit and vegetables (from 14% in 1998 to 21% in 2014). Meanwhile, the share of fresh fruit and vegetables (FFV) was reported to represent an insignificant portion of supermarket retail sales in 1998 but increased to 8% in 2007 (Natawidjaja et al., 2007). Based on interviews with the three leading supermarkets in Indonesia (Carrefour, Giant, and Hypermart), Sahara et al. (2015) revealed that this share was almost doubled to 15% in 2014. Furthermore, Pingali (2007) described this changing demand pattern toward a "westernization of diets" as an important driving force of the agri-food system transformation. The growing demand cannot be met solely by the traditional food supply chain and it requires the modernization and integration of the food retail sector (from farmer to consumer), including the fruit and vegetable supply chain, which is the focus of this study.

Factors influencing urban consumer preferences for food retail formats when purchasing fresh fruit and vegetable

The first objective of this study is to analyze the determinant factors that affect consumer choices on retail formats when purchasing fresh fruit and vegetables. A structured questionnaire was constructed to obtain shopping preferences from 887 households in the Jabodetabek region (Jakarta, Bogor, Depok, Tangerang and Bekasi), Indonesia. Our research results similarly confirmed that the diffusion process of modern markets in developing countries has occurred across socio-economic segments and geographic areas (Kelly et al., 2014). However, based on product category diffusion, we found that at the present time, modern retail formats have been unable to capture the major share of the FFV products in the Jabodetabek region, Indonesia. Traditional food retail formats such as wet markets, kiosks (*warungs*), and peddlers remain the essential elements in the fruit and vegetable supply chain in Indonesia. As shown in Figure 1 (a), consumer preferences for the modern retail formats as the first choice outlet for purchasing fruit was 35.17%, while the traditional retail format (wet markets, kiosks/*warungs*, and peddlers) were the main choice for the majority of respondents. The preference for purchasing fruit from a traditional retail format noted about 25.37% from kiosks/*warungs*, 34.50% from wet markets, and 4.96% from peddlers. Meanwhile, a total 40% of respondents indicated that they shopped most for vegetable at wet markets, 25% purchased at kiosks/*warungs*, 17% shopped at peddlers, 7% purchased at supermarkets, 6% shopped at hypermarkets, and only 5% purchased at minimarket and modern specialty stores (Figure 1 (b)). These data suggest that if all of the traditional retail formats counted (88%), it is the main choice for the majority of respondents in purchasing vegetable.
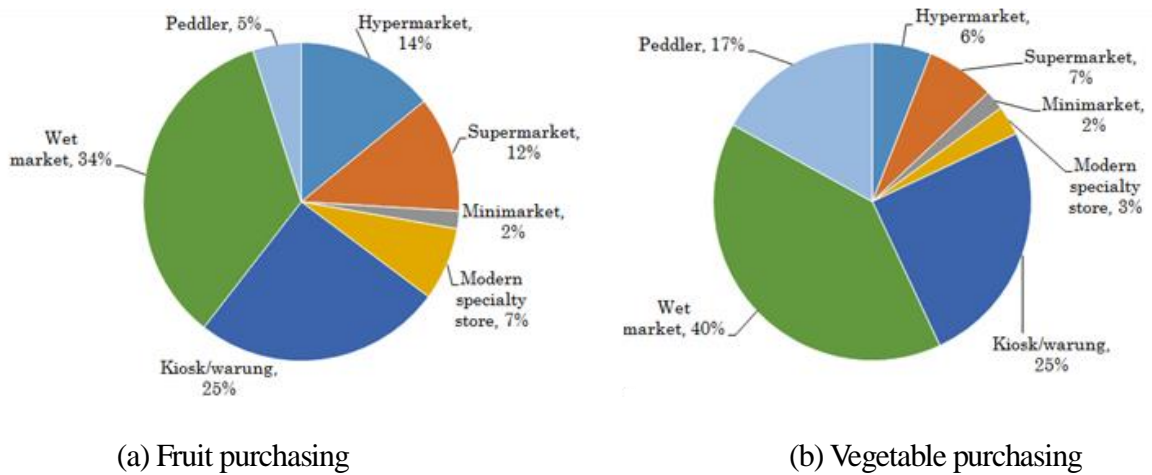
(a) Fruit purchasing

(b) Vegetable purchasing

Figure 1. Preferred retail formats for purchasing FFV in the Jabodetabek region

By investigating the role of consumers in modern market diffusion using a multinomial logit analysis, we found that consumers' choice of a traditional or modern retail format are determined by age, marital status, residence area, education level, monthly income level, employment status of women, and household size (Table 2). We also found that several consumer motivation factors, such as product quality, safety, price, ease and availability, store environment, and brand and traceability attributes, also play an important role in their choice of traditional or modern retail formats.

Table 2. Parameter estimates from the multinomial logit model for fruit and vegetable purchasing

Variable	Fruit retail choices						Vegetable retail choices					
	Modern outlets vs. Kiosks/warungs		Modern outlets vs. Wet markets		Modern outlets vs. Peddlers		Modern outlets vs. Kiosks/Warungs		Modern outlets vs. Wet markets		Modern outlets vs. Peddlers	
	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)
Intercept	0.793		0.055		0.874		0.722		−0.186		0.007	
Purchasing dimensions												
Quality	−0.013	0.987	−0.082	0.922	−0.217	0.805	0.327***	1.386	0.129	1.138	0.078	1.081
Environmental concerns	−0.089	0.915	−0.055	0.946	0.046	1.047	-0.182	0.834	-0.005	0.995	-0.154	0.857
Safety	−0.011	0.99	−0.060	0.942	−0.235	0.791	0.136	1.145	0.267***	1.306	0.242**	1.274
Brand & Traceability	−0.457***	0.633	−0.329***	0.719	−0.356**	0.701	−0.942***	0.390	−0.530***	0.589	−0.821***	0.440
Store attributes	−0.405***	0.667	−0.517***	0.596	−0.600***	0.549	−0.425***	0.654	−0.406***	0.666	−0.476***	0.621
Price	0.123	1.131	0.342***	1.407	0.425**	1.529	0.208**	1.231	0.223**	1.249	0.280**	1.323
Health	−0.033	0.967	−0.037	0.963	−0.031	0.969	0.176	1.192	-0.021	0.979	0.066	1.069
Easiness & Availability	0.265***	1.304	0.320***	1.377	0.224	1.252	0.225**	1.252	0.307***	1.359	0.131	1.140
Socio-demographic												
Age	0.018*	1.018	0.005	1.005	−0.011	0.989	0.021	1.021	0.010	1.010	0.019	1.020
Gender	−0.430	0.65	−0.322	0.724	0.069	1.071	0.336	1.399	0.168	1.183	0.610	1.840
Domicile	0.566***	1.762	0.539***	1.715	−0.036	0.965	0.546**	1.726	0.603***	1.828	0.609***	1.838
Marital status	0.133	1.143	0.738***	2.092	0.577	1.781	-0.025	0.975	0.202	1.224	0.157	1.170
Household size	−0.034	0.966	0.07	1.073	0.144*	1.155	-0.087	0.917	0.006	1.006	-0.009	0.991
Education	−0.316*	0.729	−0.747***	0.474	−1.048***	0.351	−0.688***	0.502	-0.159	0.853	0.146	1.157
Employment status of women	0.154	1.167	0.510**	1.665	0.024	1.024	0.028	1.028	0.076	1.079	-0.533*	0.587
Income	−0.422***	0.656	−0.392***	0.675	−0.784***	0.457	−0.306**	0.736	-0.174	0.840	-0.424***	0.654
Purchase frequency	−0.118	0.888	0.126	1.135	0.095	1.100	0.205	1.227	0.088	1.092	0.520**	1.683

Pseudo R^2 : Cox and Snell (0.247), Nagelkerke (0.270) Pseudo R^2 : Cox and Snell (0.232), Nagelkerke (0.249)
Likelihood Ratio Tests: Chi-square: 251.159 df: 51 Sig < 0.001 Likelihood Ratio Tests: Chi-square: 233.981 df: 51 Sig < 0.001

Notes: ***, ** and * indicate the significance level 0.01, 0.05, and 0.10, respectively; (the reference category is modern market)

Variable definition: age= actual age (years); gender= male (0), female (1); domicile= urban (1), sub-urban (2), and rural (3); marital status= single (0), married (1); household size= actual (person); education= primary (1), secondary (2), and tertiary (3); employment status of women= unemployed (0), employed (1); monthly income (IDR 000)= <1000 (1), 1000-3000 (2), 3000-5000 (3), 5000-7000 (4), and >7000 (5); and purchase frequency= once a month (1), several times a month (2), once a week (3) and every day (4); and all items of purchasing dimensions were measured using a 7-point Likert scale ranging from "very unimportant/disagree" (1) to "very important/agree" (7).

Modern retail shoppers are identified as consumers who are prefer to shop in convenient places (store environment) and purchase products with certain brand and traceability attributes. Meanwhile, we also verified that the main barrier to developing modern market outlets is continued dominance of the traditional markets in terms of price, ease and availability, as well as product quality and safety.

Therefore, our results convey a message for food retail stakeholders regarding developing future strategies for modern and traditional retail formats. To attract additional buyers, modern food retailers may need to maintain and enhance their advantage in popularity by offering clean, convenient, secure, practical, product origin identified, branded, and certified products, as well as other main attributes such as quality, variety, ease, and service. On the other hand, to retain a dominant market share, traditional outlets may need to enhance their product quality by adopting the necessary storage technologies and improve the outlet environment.

The determinants of organic vegetable purchasing in Jabodetabek region, Indonesia

Alongside the transformation of modern retail and agri-food production systems in developing countries, increased public awareness of the health and preservation of the global environment has affected consumer behavior in consuming healthy food which produced without damaging the environment (Suharjo et al., 2013). Modernization and industrialization of agri-food production has been characterized by the excessive use of synthetic chemical inputs to protect crops against weeds, pests and diseases to improve yield productivity (Roitner-Schobesberger et al., 2008). Because of this practice, consumers worry about potential hazards, such as residues in food that are perceived to be associated with long-term and unknown effects on health (Chen, 2007). In addition, numerous food supply crises in recent years, such as mad cow disease, the foot-and-mouth epidemic, the Belgian dioxin scandal, and fear of harmful microorganisms, such as salmonella and *Escherichia coli* 0157, have also contributed to increasing consumer concerns about the quality of the food they consume (Chen, 2007; Hughner et al., 2007). Those issues have played an important role in understanding the purchasing pattern of consumers and encouraging the increasing demand of sustainable foods, such as those produced organically, including in Indonesia. Therefore, the second objective of this study is to explore the factors that drive consumer preferences in purchasing organic vegetables and determines factors that help explain consumer preferences in purchasing organic vegetables. In this study, we also using previously obtained data from 887 households in the Jabodetabek region (Jakarta, Bogor, Depok, Tangerang and Bekasi), Indonesia.

This study found the following. First, the four most important factors were identified through factor analysis: attitude toward organic food, environmental concerns, safety and health, and degree of trust. These factors are perceived by Indonesian consumers as motives for purchasing organic vegetables. In addition, we also found that consumers of organic vegetables seem to have a higher degree of agreement with all the factor statements compared with consumers of conventionally grown vegetables. Second, binary logit analysis reveals that consumer choices are significantly associated with consumer attitudes toward organic food, consumer concerns about environmental issues, consumer concerns about their own health and safety, the degree of trust in organic vegetables, the degree of acceptance of current prices, and several socio-demographic variables: gender, household size, and income (Table 2). The results indicate that women and larger families are less likely to buy organic vegetables. However, economic variables such as household income and degree of acceptable price somewhat affect the decision to purchase organic vegetables. Income positively affects the preference for organic vegetables, since consumers with higher incomes are more willing to buy organic vegetables. Meanwhile, price is still noted as the largest obstacle for the majority of consumers. This study also suggests that consumers who have positive attitudes toward organic food, perceive higher health and safety motives, emphasize the importance of environmental attributes, and trust organic attributes are more likely to buy organic vegetables. Therefore, based on the study results, the following are needed for organic vegetable development in Indonesia: (a) implement an appropriate pricing strategy; (b) encourage organic labeling and certification for vegetables; and (c) intensively promote organic food with respect to consumer motives and concerns about health, safety, and environmental sustainability.

Table 2. Estimated logit model for consumers' organic vegetable purchasing.

	B	S.E.	Sig.	Exp(β)
ATTITUDE	1.175	0.138	0.000 ***	3.239
ENVIRONMENT	0.304	0.103	0.003 ***	1.355
SAFETY & HEALTH	0.218	0.107	0.041 **	1.243
TRUST	1.957	0.139	0.000 ***	7.079
PRICE	−1.059	0.325	0.001 ***	0.347
AGE	−0.010	0.010	0.294	0.990
GENDER	−0.685	0.327	0.036 **	0.504
HSIZE	−0.100	0.056	0.073 *	0.905
EDU2	0.373	0.394	0.345	1.451
EDU3	0.299	0.432	0.488	1.349
INCOME2	0.097	0.238	0.685	1.101
INCOME3	0.942	0.386	0.015 **	2.565
EMPLOY	0.306	0.226	0.175	1.358
CHILD	0.035	0.226	0.878	1.035
Constant	0.952	0.682	0.163	2.590
$L_0 = -2$ Log Likelihood (initial)		1174.113		
$L_1 = -2$ Log Likelihood (final)		661.561		
Cox and Snell R square		0.440		
Nagelkerke R Square		0.598		
Hosmer and Lemeshow Test		0.610		
Prediction accuracy		82.5%		

*** Significant at 1%; ** significant at 5%; and * significant at 10%.

Variable definition: AGE= actual age (years); GENDER= male (0), female (1); HSIZE= actual (person); EDU2 (secondary education)= Yes (1), otherwise (0); EDU3 (tertiary education)= Yes (1), otherwise (0); INCOME2 (monthly income IDR 3000,000-7000,000)= Yes (1), otherwise (0); INCOME3 (monthly income IDR >7000,000)= Yes (1), otherwise (0); EMPLOY= unemployed (0), employed (1); CHILD (children < 18 years old= No (0), Yes (1); PRICE= Not expensive (0), expensive (1); and all items of attitude toward organic food (ATTITUDE), consumer concerns about environmental issues (ENVIRONMENT), consumer concerns about their own health and safety (SAFETY & HEALTH), and the degree of trust in organic vegetables (TRUST), were measured using a 7-point Likert scale ranging from "very unimportant/disagree" (1) to "very important/agree" (7).

Small-scale vegetable farmers' participation in modern retail market channels

The transformation of agri-food systems creates both opportunities and challenges for producers (Reardon et al., 2012; Sahara et al., 2015; Weatherspoon and Reardon, 2003). Previous studies show that the proliferation of supermarkets can be associated to increases in farm household income and reduction of rural poverty (Minten et al., 2009; Schipmann and Qaim, 2011) because supermarkets offer higher net prices than traditional markets to farmers who can meet their requirements (Miyata et al., 2009). However, for small-scale farmers who have limited capacity to respond to requirements of quality, consistency, volume, and transaction specifications imposed by the modern food industry, there are widespread concerns and debate among researchers and policy makers that they will be potentially excluded from the transformed markets (Reardon et al., 2009; Sahara et al., 2015). Therefore, the third objective of this study is to examine the supermarket participation and its effect on the well-being of small-scale farmers in Indonesia. Data were collected through a household survey with 137 vegetable farmers in Cipanas-Cianjur Regency and Leuwiliang-Bogor Regency, West Java Province, Indonesia.

The results suggest the following. First, we found differences in household characteristics between farmers participating in traditional and supermarket channels. Farmers who participate in supermarket channels can be identified as younger and well-educated farmers as well as have higher assets. Supermarket channel farmers apply higher inputs and therefore produce higher yields. They are also more likely to perform post-harvest activities before selling their products and keep good written records. On average, supermarket channel farmers perceived their income from vegetable farming has increased compared with traditional channel farmers. Second, farm size and various assets (except irrigation, packaging equipment, and storage facilities) were not significant determinants of participation in supermarket channels, which suggests that small-scale farmers will not necessarily be excluded from growing supermarket channels (Table 2). The findings also show several constraints

faced by small-scale farmers who participate in the supermarket channel, especially related to their level of education and access to asphalt roads.

Table 3. Determinants of farmers' participation in the supermarket channel and the effect on income.

Variable	Coefficient	SE	P(|Z| > z)
Selection equation			
Dependent variable: supermarket participation dummy			
Age of household head (years)	−0.032	0.018	0.076 *
Proportion of adults between 15 and 65 years (%)	0.009	0.007	0.221
Number of household members (person/s)	0.201	0.138	0.147
Education level of household head (1 = elementary school – 4 = university)	0.502	0.176	0.005 ***
Farming experience (years)	0.005	0.016	0.783
Land ownership (ha)	0.735	1.151	0.524
Irrigated land (1 = irrigated, 0 = no)	0.737	0.337	0.031 **
Pick-up truck ownership (unit)	0.950	0.705	0.181
Motorcycle ownership (unit)	0.047	0.249	0.849
Mobile phone ownership (unit)	−0.332	0.215	0.127
Packaging equipment ownership (unit)	0.783	0.350	0.027 **
Water pump ownership (unit)	0.024	0.108	0.828
Sprayer ownership (unit)	−0.661	0.271	0.016 **
Storage house ownership (unit)	1.680	0.503	0.001 ***
Distance from house to asphalt road (km)	−0.426	0.220	0.055 *
Distance to modern market/Jakarta (km)	0.015	0.012	0.218
Source of capital (1 = cash loan/credit, 0 = private)	−0.771	0.571	0.180
Constant	−2.639	1.591	0.100
Outcome equation			
Dependent variable: net income per capita (log)			
Age of household head (years)	−0.007	0.003	0.033 **
Proportion of adults between 15 and 65 years (%)	0.002	0.001	0.096 *
Number of household members (person/s)	−0.116	0.024	0.000 ***
Education level of household head (1 = elementary school – 4 = university)	−0.026	0.030	0.390
Farming experience (years)	0.003	0.003	0.318
Land ownership (ha)	0.163	0.055	0.003 ***
Irrigated land (1 = irrigated, 0 = no)	−0.050	0.071	0.479
Pick-up truck ownership (unit)	0.283	0.140	0.046 **
Motorcycle ownership (unit)	0.030	0.041	0.466
Mobile phone ownership (unit)	0.109	0.048	0.026 **
Packaging equipment ownership (unit)	−0.047	0.058	0.420
Water pump ownership (unit)	0.012	0.017	0.489
Sprayer ownership (unit)	−0.035	0.055	0.533
Storage house ownership (unit)	0.098	0.072	0.179
Source of capital (1 = cash loan/credit, 0 = private)	−0.127	0.109	0.248
Channel participation (1 = supermarket, 0 = otherwise)	0.194	0.018	0.000 ***
Constant	6.659	0.209	0.000
Ath (ρ)	−0.972	0.001	0.000 ***

SE = standard error, Log likelihood = −27.08. * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Third, supermarket channel participation positively affects income, which implies that linking small-scale farmers to supermarket channels could be a useful strategy to improve the income of small-scale farmers. Therefore, our study recommends that the government should provide the training programs needed (in production methods, quality improvement, system traceability, and marketing access) as well as improve rural infrastructure (irrigation, roads, packing houses). These actions are needed to help some farmers meet the requirements of supermarkets. In addition, to improve marketing access and reduce transactions costs, strategies could be implemented by improving the systems for disseminating market information; providing services such as technology for processing, packing, and cooling; establishing a clear framework for quality grades and standards; supporting collective action and farmer organization; and motivating farmers to meet the quality requirements of consumers, all to help connect small-scale farmers to the modern retail channel.

Sustainable fruit and vegetable supply chain management based on small-scale farmers' participation in modern retail channels

Another important issue in the inclusion of small-scale farmers in the modern retail channels is how their participation can be enhanced and sustained. Implementing sustainable supply chain management (SSCM) practices can be considered an essential strategy for food supply chain actors to addressing the issue (Fayet and Vermeulen, 2014). By implementing SSCM practices, profits can be achieved by reducing risks and environmental impacts, while at the same time improving economic performance and providing social benefits. Thereafter, it should lead to increased competitive advantages and ensure the sustainability of the inclusion process for small-scale fruit and vegetable farmers in modern retail channels. Therefore, the fourth objective of this study is to provide a framework and systematic review by analyzing enablers for implementing sustainable fruit and vegetable supply chain management based on small-scale farmers' participation in modern retail channels. Through an extensive literature review, we identified 15 representative enablers and studied the relationship between them and learned how they affect sustainability development by using an interpretive structural modelling (ISM) method. The ISM approach helps to understand order and direction on the complexity of relationships among the enablers and transforms unclear and poorly articulated system models into visible and well-defined models (Attri et al., 2013; Faisal and Talib, 2016; Raut et al., 2017; Sage, 1977). The relationship between the enablers then modeled into a six-level hierarchical structure (Figure 2) and further classified into clusters in a diagram, based on their driving power and dependence power by applying the MICMAC technique.
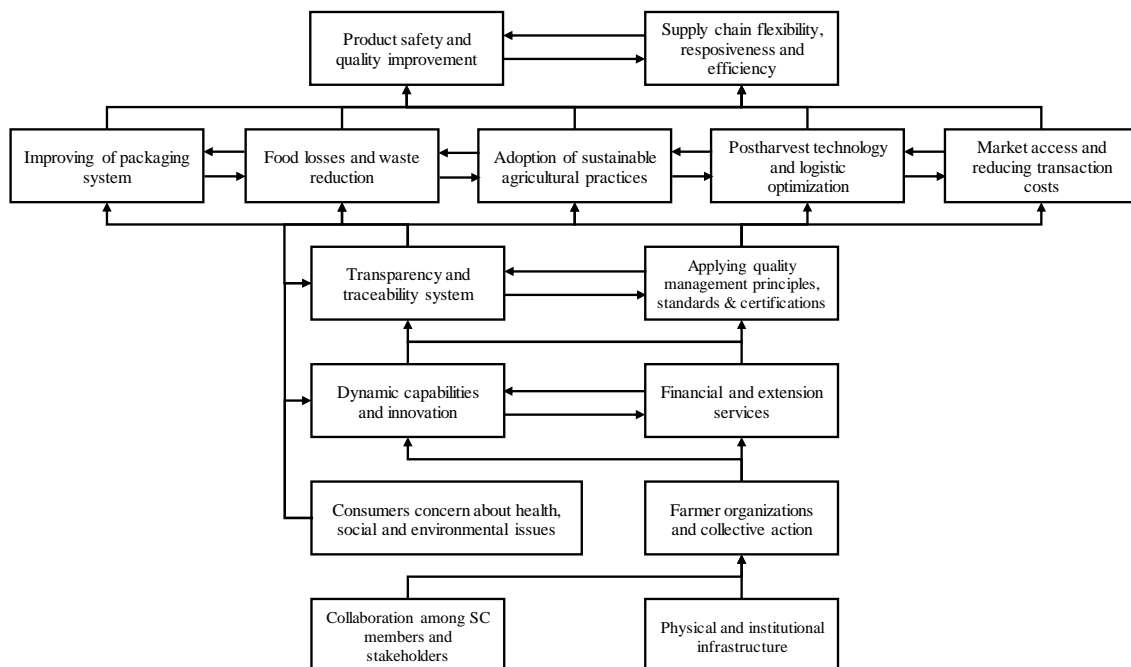

Figure 2. ISM model showing levels of sustainable supply chain management enablers

Several enablers, such as physical and institutional infrastructure and collaboration among supply chain members and stakeholders, were found to have strong driving power and were fundamental to implementing SSCM practices. We also found enablers that depend strongly on other enablers, such as

product safety and quality improvement, and supply chain flexibility, responsiveness, and efficiency. These findings offer valuable insight for supply chain actors by helping them evaluate the potential for successfully implementing SSCM practices. Understanding how these enablers affect the implementation of SSCM practices should help the actors to be more focused in concentrating their efforts and allocating their resources more efficiently to achieve the goals.

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