

Green Manufacturing in Agro Processing SMEs: Unraveling the Relationship Between Drivers and Their Effects on Adoption Practices in Ghana

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Abstract

Environmental matters have been a subject of importance for national policy makers, ecology concerned groups and organizations. Green initiatives such as, green manufacturing has been seen to be a game changer in ensuring environmentally safe manufacturing by firms and nations while reaping the accompanying benefits. Investigations into motivating factors are still not fully carried out from all contexts. This research sought to find the effects that these drivers have on adoption of eco-friendly initiatives among small and medium enterprises from a developing country context. Structural Equation Model was adopted to analyze the data and verify the hypotheses. The outcomes indicate that financial and business benefits, competitor pressure and national environmental regulations positively influenced the adoption of green manufacturing adoption initiatives. Management and staff commitment influenced adoption slightly. These outcomes are vital to developing strategies for improving green practices implementation within firms for positive environmental and economic performance. Governments in developing nations especially Ghana will be well informed on which parts of the regulations to strengthen and enforce for improved environmental responsibility from Ghanaian agro processing small and medium enterprises and other businesses.

Keywords: Green manufacturing, SMEs, Drivers, Adoption practices, Agro processors

1. Introduction

In past decades, the subject of sustainability and greening has attained heightened attention from both actors in business and the general society. The reason being that development in a sustainable manner has come to be seen as the appropriate approach towards achieving a fairer and prosperous world in which the natural resources, the environment and mankind can coexist and be protected for the benefit of coming generations (Evangelista et al., 2018).

The relevance of considering environmental aspects in the business context can be easily found in the current literature. Commitment to the environment has become a key variable in the contemporary competitive scenario (Molina-Azorin et al., 2015; Soubihia et al., 2015). Companies recognize the fact that environmental sustainability has implications for their competitive positions (Godinho Filho & Ganga, 2016). There is a growing interest of the state, managers, customers, employees and academics regarding marketing strategies focused on the environment (Kumar & Christodouloupoulou, 2014).

With the desire of developing economies and less industrial firms to grow into developed and industrialized ones, manufacturing (value addition) has been an inevitable approach towards achieving this objective. However, with the advent severe environmental deterioration, green manufacturing has received an increasing attention and it is being thought of as an essential path to achieve firm's environmental sustainability (Díaz-García et al., 2015; Le Van et al., 2019).

At present, the manufacturing industry has been shifting rapidly due to the increasing awareness of sustainable manufacturing activities. Thus, manufacturing firm have implemented various sustainable practices to reduce carbon footprint, remain competitive and as an answer to the global concern of environmental degradation. Some of the practices are known as Environmentally Conscious (Despeisse et al., 2012), Lean Manufacturing (Vienazindiene & Ciarniene, 2013) and Green Manufacturing (Rehman & Shrivastava, 2013). Scholars such as (Hart & Dowell, 2011), focus on large corporations, as is implicit in the labels corporate social and environmental responsibility. Yet understanding why and how small and medium enterprises (SMEs) respond to environmental and social concerns is vital. SMEs play an important role in economic development and employment creation (Baumann-Pauly, Wickert, Spence, & Scherer, 2013, Hamann et al., 2017).

In their work, Ampadu-Ameyaw and Omari (2015) expressed that, the Agro-food industry plays a fundamental role in the creation of income and employment opportunities in Ghana. It is important to sustain or improve the situation further. Despite the reality that these enterprises proffer opportunities for poverty reduction, food security and community development, they are not without challenges. Paramount among these challenges which have caught the attention of researchers in recent time is their negative effects on the environment. "Going green" has been one of the important ways that companies have dealt with environmental issues. To facilitate the adoption of green innovations, companies must consider the important drivers and antecedents in their businesses (El-Kassar, 2019).

As a country in Sub Saharan Africa that aims to achieve a middle income status, governments of Ghana over the years have been adopting several measures to achieve this objective. However, the negative effects that accompany the industrialization drive in the manufacturing

sector due to production processes cannot be overlooked. Therefore, it calls for the application of methods that are environmentally friendly so as to make gains from such economic development measure, whilst protecting the environment.

Previous studies have been conducted on green related issues in Ghana's economy. For instance Braimah (2015) studied the impact of green brand awareness on consumer purchase decisions in Ghana, a focus on green purchasing; Amankwah-Amoah and Sarpong (2016) studied historical pathways to a green economy in which the emphasis was on the solar PV in Ghana; Kwarteng et al. (2016) in their studies delved into reverse logistics practices in Ghana with emphasis on the pharmaceutical industry.

This work uniquely and singularly draws attention to the manufacturing sector of Ghana, specifically the agro processing sub sector to fill a long left gap. Specifically, this study seeks to delve into factors that motivate the adoption of green manufacturing techniques and their influence on the adoption processes among small and medium firms in the agro processing industry in Ghana. The choice for the small and medium firms is because; they form the majority of processing firms in the Ghanaian agro processing landscape (Quartey and Darkwa 2015). With the outcomes of this study, government and industry players in the Ghanaian manufacturing landscape can fine-tune the state policies and managerial decisions for better environmental responsibility.

2. Literature Review and Hypothesis

In this research, a green manufacturing drivers and adoption model was developed that comprised six basic driver variable which are internal and external to the firms based on past literature and consultation with experts in this area of study. These include; management and staff green manufacturing commitment, Financial and business benefits; Firm's resources and consumer environmental awareness and demands; competitor influence; national environmental regulations and civil society group pressure respectively.

2.1 Management and Staff Commitment and Green Manufacturing Practices Adoption

A key driving force behind crafting an environmentally friendly business strategy is top management's sensitivity to green issues (Papagiannakis et al., 2014; Leonidou et al., 2015). This is because managers are responsible for, setting objectives, policies, and procedures that smooth the way toward proper adoption of green initiatives in the organization, as well as embarking on a more proactive approach to ecological problems that usually involves significant investments in both resources (e.g., technologies) and capabilities (e.g., relationship building) (Christensen et al., 2014); embodying environmental elements in key business processes (e.g., new product development, manufacturing process, market sensing) vital to achieving a market-oriented organization (Leonidou et al., 2017); and coordinating environmental initiatives, backing these initiatives by appointing the right people to supervise the firm's green activities, training employees to care about environmental issues, and motivating personnel to becoming more ecologically conscious through the provision of incentives (e.g., special awards) (Chen et al., 2015). According to Pinto and Allui (2016) among other studies, internal drivers have the highest impact on green practices. Top management commitment to environmentally-friendly actions has been observed to be traits in the absence of which green practices implementation becomes difficult or impossible

(Bhanot et al., 2017).

From the viewpoint of Govindan et al. (2016), a firm's acceptance and implementation of green manufacturing strategies does not rely only on committed top managers but also on employees or staff awareness and support. They are more conversant with the methods of operations and are likely to have broader ideas about how to make the firm's process less harmful to the environment.

H1a: Management and staff commitment significantly influences the adoption of green manufacturing by SME agro processing firms.

2.2 Firm's Resource and Green Manufacturing Practices Adoption

Defining resources, the initial Resource-Based View (RBV) of strategy recognized resource only as anything which could be seen as a strength or weakness of a company (Wernerfelt, 1984). According to the RBV resources in comparison with products are basis for a firm's competitive advantage (Barney, 1991; 2017). In redefining resources, it was referred to as the input to the manufacturing process, including equipment, financing, skilled staff, knowledge resources, information technology and others that are crucial to firm's competitive advantage as they should be hard to be bought, copied or rare to access (Kozlenkova et al., 2014).

Organizational resources are tangible (e.g., finance, equipment, installations) or intangible (e.g., technical know-how, reputation, experience) assets controlled by the firm that help to design and implement strategies that will improve business performance (Lin & Wu, 2014). Verbeke and Tung (2013) observed that from RBV context, resources are necessary to ensure the success of programs initiated in the business such as the introduction of green manufacturing practices. According to Adams et al. (2016) using the RBV, a firm that has invested in and so have access to technology, processes, systems, guiding blueprints and training can enhance its environmental competence and implementations such as adoption of eco-friendly practices. Although small firms, by default, have limited organizational resources, those that are in a position to make wise use of appropriate resources for environmentally friendly purposes are very likely to achieve superior performance (Klewitz and Hansen, 2014).

H1b: Firm's resources significantly influence the adoption of green manufacturing by SME agro processing firms.

2.3 Financial and Business Benefits, and Green Manufacturing Practices Adoption

The economic urge pressures to adapt GM as it practices effect on the optimal resource and energy usage, which enhances the financial benefit of the manufacturer. Applying different approaches to minimize the total waste may mean using fewer raw materials per unit of product, reducing the weight and thickness of the packaging, and thus saving money for the firms (Zhu et al., 2019), an idea also shared by Barzegar et al. (2018). Recycling materials (e.g. metal scraps) within the firm can eliminate waste and minimize the SME's purchase of new raw materials. Arguments arise as to whether adoption of green strategy has benefits or it is simply buzzword. Research has revealed that many players are not aware of its benefits and even those that are aware are hesitant to change. Implementation of environmental management can provide several monetary and non-monetary benefits for organizations. The benefits of implementing green practices include costs saving (Johnson, 2015), gaining

competitive advantage (Yaacob et al., 2016), increased organizational efficiency (Hillary, 2017), and enhanced company reputation (Park & Kim, 2014). Various studies have thrown more light on how adding value to products creates returns. This research looks at it from how a firm's value addition process application in a green environment, creates an eco-friendly product that is likely to receive sales from green product conscious consumers and earn the firm returns, while minimizing cost. Previous literature supports the theory that firms that implement green strategies show positive relationship in minimizing operational cost, and as a result save the firm financial resources, and improvement in their environmental performance (Esfahbodi et al., 2016). Again, according to Bossle et al. (2016) and del Mar Miras-Rodriguez et al. (2018), savings on expenditure has come to be known as one of the basic drivers of eco-friendly behaviors among firms. One of the possible avenues available to firms that need to or desire to cut expenditure is to engage in instituting green practices in their operational activities.

H1c: Financial and business benefits influence the adoption of green manufacturing by SME agro processing firms.

2.4 Consumer Green Awareness and demand, and Green Manufacturing

Several studies have discussed the impact of customer pressure on companies' decisions regarding environmental practices (Weng et al., 2015; Li et al., 2019). Customer expectations have become one of the most important factors influencing companies' environmental practices (Hsu et al., 2013). More and more customers now have strong concerns about the environment and prefer to purchase environmentally friendly products (Vishwakarma et al., 2018). Literature have shown that, the environmental consciousness of consumers is making them start to probe the effect of their purchased products on the environment, thereby expecting companies to take up some levels of green strategies in the design of their process and products (Kim et al., 2017). From an institutional theory perspective, business enterprises are forced to conform and be seen as legitimate and trustworthy through normative pressure (Daddi et al., 2016). Customers may refuse to buy products that damage the environment, which encourages companies to create green products (Li et al., 2017). Firms in their effort to retain their consumers pay attention to feedbacks from consumers. Due to the increased awareness of current consumers, their environmental concerns forces firms to adopt eco-friendly strategies in their business activities. In Malaysia the environmental concerns of consumers is a primary source of normative pressure on producers to take up green strategies (Rohati et al., 2016). They have the capacity to indirectly affect the firm's environmental strategies (Weng et al., 2015).

H1d: Consumer green awareness and demand influence the adoption of green manufacturing by SME agro processing firms.

2.5 Competitor Pressure and Green Manufacturing Practices Adoption

Companies usually react and respond to the actions of their competitors. When competitors adopt new environmental practices, companies in the same industry will feel pressured to re-evaluate their current status regarding environmental responsibility and to decide whether to increase and/or improve the implementation of environmental practices (Hsu et al., 2013; Marano & Kostova, 2016). In most environments where firms operate, there is usually

pressure from the quarters of other competing firms in the same industry that pushes firms to embrace and implement green initiatives aimed at staying competitive in the market and gain the advantage therein (Iranmanesh et al., 2018).

With continuous pressure from competitors, many firms are forced to integrate design for environmental safety not only in their production process but also in their function as partners within the supply chain (Yenipazarli, 2019). According to institutional theory, factors that drive a firm to embrace green strategies can be grouped into coercive, normative and mimetic (Tachizawa et al., 2015). The mimetic form of drivers according to institutional theory becomes evident when firms imitate the actions of their competitors who they have observed to have been successful in the industry they operate in, with the aim of copying their approach to that success and subsequently gain legitimacy (Govindan, 2018).

Other studies opined that, out of pressure from competitors, many companies in Malaysia have allocated funding into reverse logistics such as recycling, refurbishment and remanufacturing (Mafini & Loury-Okoumba, 2018). This was similar to the study of Eltayeb and Zailani, (2007) in which they observed that large firms in Malaysia working with other leading firms in developed economies have been compelled to not just focus on their direct suppliers but also their lower tier suppliers. In general, companies need to be aware of their competitors' offerings and industry norms to ensure that their innovation capabilities are similar to those of the rest of the industry. Therefore, to sustain competitive advantages, companies may imitate the environmental activities of competitors, especially the leaders in their industries (Galeazzo & Klassen, 2015; Dangelico, 2016).

H1e: Competitor pressure significantly influences the adoption of green manufacturing by SME agro processing firms in Ghana.

2.6 National Environmental Regulations and Green Manufacturing Practices Adoption

State regulations and enforcement as a driving factor provides some form of environmental boundaries within which firms need to work to ensure sustainability in their operations. A number of studies have investigated the relationships between governmental regulations and environmental practices and have suggested that governmental pressure is one of the most significant external stakeholders, such as, (Wolf, 2013; Dixon-Fowler et al., 2017). Regulatory changes and enforcement of these changes by the government affect companies' actions regarding environmental management (Lin et al., 2014; Chu et al., 2018) and sustaining their business. Additionally, to compete globally, companies need to follow both global and local regulations to protect the environment. These official mechanisms take the form of standards, laws, procedures and incentives set by regulatory institutions to inspire firms to become environmentally responsible. Literature in the past supports the idea that requirements imposed by government and regulatory bodies provide ultimate incentives for firms to adopt green practices, especially in the supply chains (Madaan & Mangla, 2015). Taking the dictates of institutional theory into consideration (del Mar Miras-Rodriguez et al. (2018), it throws more light on the fact that firms in their effort to be accepted by the public as legitimate are influenced by elements such as regulations that govern their activities. Legitimacy in this case refers to when firms embrace eco-friendly strategies that are seen by stakeholders as right and suitable (Roman, 2017). Fernando and Wah. (2017) examined advanced economies such as China and found out how coercive pressure through laws and

regulations enhanced environmental consciousness, thereby raising environmental management practices. The rigorousness of the regulations and firms' perceptions of the stringency of the regulations compels companies to actually implement environmental protection practices (Guoyou et al., 2013; Zailani et al., 2015). Moreover, the government's support and enforcement of the regulations has a significant impact on companies' environmental policies and adoption of green strategies (Singh et al., 2014; He et al., 2016), making this an important task to investigate.

H1f: National environmental regulations influence significantly influences the adoption of green manufacturing by SME agro processing firms in Ghana.

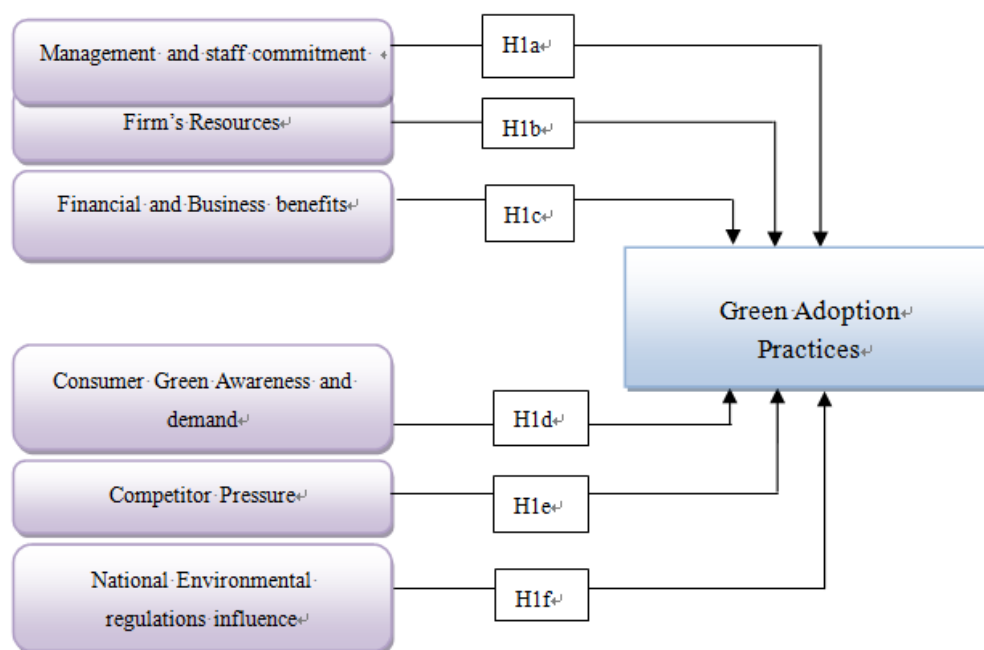


Figure 1. Conceptual model

3. Methods and Results

3.1 Instrument Design

A questionnaire survey approach was developed to investigate the proposed model. Based on a review of the literature, we designed a structured questionnaire with six primary constructs grouped under two headings. To ensure that the questionnaire would more precisely extract the data sought for the current study, a mini pilot survey with production managers and supervisors of 40 selected small and medium agro processing firms in Ghana was conducted. Respondents were asked to review and complete the questionnaire (i.e., as a pre-test) to identify ambiguities and suggest improvements to the questionnaire. An examination of the feedback led to further refinement and, eventually, the final version. All of the variables were measured on multiple item five-point Likert scale (1 = strongly disagree, 2=agree,

3=undecided, 4= disagree, 5 = strongly agree).

3.2 Measurement of Constructs

The survey questionnaire was in English. The method of collecting the survey information involved close contact between respondents and the researchers. The items adapted for this study were from past literature. Management and staff's

GM commitment was measured using 4 items from Govindan et al. (2015), Financial and Business Benefits using 5 items from Govindan et al. (2015), Dornfeld et al. (2013); Firm's resources was measured using 5 items from Leonidou et al. (2017), Consumer awareness and demand was measured with 5 items from Ramakrishnan et al. (2014), Govindan et al. (2015); Competitor influence or pressure was measured with 4 items from Sarkis et al. (2010), Tachizawa et al. (2015); National environmental regulations and Civil Society Groups' influence Zhu and Geng (2013), Abdul-Rashid et al. (2017).

3.3 Sample and Data Collection

The data used in this study comprised of survey questionnaire responses from the agro processing industry. Selecting this industry for this study was influenced by the fact that, they form the larger percentage of the manufacturing sector in Ghana, while their operations are viewed as having the most direct and observable impact on the environment. For the purpose of this study, the target respondents are simply the supervisors and the production managers of the target firms. This is due to the fact that, these are the officers perceived to have direct connection to the processes of manufacturing in these firms and is likely to oversee any change in methods of manufacturing as required.

Most of the questionnaires were dispatched to managers and production supervisors in these SMEs due to the fact that, most of these officers likely are much conversant with production and production strategies in their firms and so can respond appropriately to the questionnaire. Respondents received an envelope that contained a cover letter and a seven-page questionnaire. To motivate respondents, the researcher presented a green manufacturing branded souvenir China to each respondent. In addition, respondents were assured of the confidentiality of their responses and participation. The sample for this study was obtained from the National Board for Small Scale Industry (NBSSI) directory. The total sample size comprised small and medium firms within Ashanti, Eastern and Greater Accra regions of Ghana. We emphasized in the cover letter that participation in the survey is voluntary and the collected data will be treated anonymously and will only be used only for research purposes. In all, 455 of questionnaire were received giving a response rate of 81.20% and 415 were usable for analysis.

3.4 Analysis Procedure

The structural equation modeling method is applied in the analysis and in applying the it, there were eleven unobserved latent variables: management and staff commitment (MSC); financial and business benefits (FBB); firm resources (FRS); consumer awareness and demand (CAD); competitor influence or pressure CIP); national environmental regulation influence (NEI); green management practices (GMP); green design practices (GDP); green purchasing practices (GPP); green promotion and selling (GPS); green logistics practices

(GLP), and forty observed constructs – four measured MSC (MSC1-4); three measured FBB (FBB1-3); three measured FRS (FRS1-3); five measured CAD (CAD1-5); three measured CIP (CIP1-3); four measured NEI (NEI1-4); four measured GMP (GMP1-4); four measured GDP (GDP1-4); three measured GPP (GPP1-3); three measured GPS (GPS1-3); and four measured GLP (GLP1-4). It must be noted that, represented as the indicators of these eleven underlying unobserved variables are these forty observed variables.

Linked to each of these observed variables is a term known as error (ee1 – ee22), and with green adoption practices (GAP) implementation representing outcome variable, a residual term (ee23 – ee40). An error that is linked to an observed variable describes measurement error that presents how adequate they are in measuring the related underlying variables. The first order represents six elements (MSC, FBB, FRS, CAD, CIP, NEI) that represented independent variables and had error terms (ee1 – ee22); with each being seen as one level, or a single unidirectional arrow, opposite from the observed variables. The second order had five elements or variables (GMP, GDP, GPP, GPS, GLP) that represented dependent variable and had residual term associated (er1 – er5), with each representing one level or a single unidirectional arrow away from the observed variables, and measuring the related underlying variables.

3.5 Results

3.5.1 Sample Description

As far as this study is concerned, small and medium manufacturing firms were chosen as the preferred sample. The firms that were studied comprised agro processing firms based on their years of operations, staff size of the firm, environmental management status, environmental management unit status and environmental management policy status. As can be seen from Table 1, almost half of the firms 41% reported to have operated for between 10 to 20 years, whilst 32% of them reported to have operated for more than 20 years. It can be said that, majority of the sampled firms 73% had operated for more than 10 years, hence knowledgeable about their firms and operations

Table 1. Descriptive statistics

Number	Variable	Category	Freq.	Percentage (%)
1	Years of Operation (N=415)	<10	108	26.0%
		10 - 20	174	41.9%
		>20	133	32.0%
2	Staff Size of the Company (N=415)	Small	270	65.1%
		Medium	145	34.9%
3	Environmental management body registration Status (N=415)	Registered	275	66.3%
		Not Registered	140	33.7%
4	Environmental management unit	Have	279	67.2%

	(N=415)	Do not Have	136	32.8%
5	Environmental management policy	Have	263	63.4%
	(N=415)	Do not Have	152	36.6%

3.5.2 Reliability and Validity

In testing the reliability of the recovered data, SPSS 19.0 was used. Reliability was ascertained using the Cronbach's alpha. Observation can be made from Table 2. that the values for each model is greater than 0.7, an indication that the adopted scale possess a stable and acceptable reliability in consistence with techniques developed by Hair et al. (2014).

In addition, using related theoretical literature, validity of the questionnaire was supported. The validity of data was examined using average variance extracted (AVE) test all of which were above the acceptable value of 0.5. It can be seen from Table 2. That all variables are reliable and valid for further analysis – these variables obtained valued higher or equal to the accepted threshold of 0.5 according to Hair et al. (2014).

Table 2. Construct items, factor loadings, AVEs and Cronbachs' alphas outcomes for variables

Variable	Factor Loading	AVE	Cronbach's Alpha
Management and Staff's GM Commitment (MSC)			
MSC1	0.860	0.682	0.840
MSC2	0.816		
MSC3	0.716		
MSC4	0.639		
Financial and Business Benefits (FBB)			
FBB1	0.754	0.646	0.724
FBB2	0.651		
FBB3	0.651		
Firm's Resources (FRS)			
FRS1	0.803	0.667	0.749
FRS2	0.680		
FRS3	0.644		
Consumer awareness and demand (CAD)			
CAD1	0.749	0.550	0.781
CAD2	0.699		
CAD3	0.686		
CAD4	0.589		
CAD5	0.582		
Competitor influence or pressure (CIP)			

CIP1	0.815	0.679	0.761
CIP2	0.714		
CIP3	0.634		
National environmental regulations and Civil Society Groups' influence (NEI)			
NEI1	0.755	0.585	0.763
NEI2	0.695		
NEI3	0.659		
NEI4	0.562		
Green Management (GMP)			
GMP1	0.632	0.505	0.772
GMP2	0.577		
GMP3	0.569		
GMP4	0.554		
Green Design Practices (GDP)			
GDP1	0.853	0.588	0.767
GDP2	0.677		
GDP3	0.586		
GDP4	0.568		
Green Purchasing (GPP)			
GPP1	0.762	0.599	0.788
GPP2	0.634		
GPP3	0.506		
Green Promotion/Selling			
GPS1	0.871	0.650	0.811
GPS2	0.803		
GPS3	0.790		
Green Logistics Practices (GLP)			
GLP1	0.811	0.637	0.810
GLP2	0.637		
GLP3	0.628		
GLP4	0.593		

3.5.3 Structural Equation Model

The Structural Equation Model could at the same time be used to assess the relationship among several latent variables, observed variables and also errors in the measures during the assessment process (Hair et al., 1998). It can also establish the nexus among several latent variables and tests the structure of their interaction. In this study, we employ SEM as a way of investigating the various proposed interactions.

The model fit indices were CMIN (X^2) = 1691.069, DF = 710, CMIN/DF (X^2/df) = 2.382, TLI = 0.781, CFI = 0.801 and RMSEA = 0.058 and imply that the measurement model was acceptable. The outcomes are presented in Table 3.

Table 3. Resulting green adoption practices model with estimated relationship and hypothesis testing

Path of Influence	Estimate	S.E.	C.R.	P	Stand. Weight	Regress.	Decision
GMP <-- MSC	-0.024	0.044	-0.548	0.584	-0.034		Not Supported
GMP <-- FBB	1.472	0.348	4.233	***	0.613		Supported
GDP <-- MSC	-0.097	0.044	-2.176	0.03	-0.119		Supported
GPP <-- MSC	-0.064	0.036	-1.776	0.076	-0.106		Not Supported
GPS <-- MSC	-0.029	0.027	-1.076	0.282	-0.075		Not Supported
GLP <-- MSC	-0.086	0.054	-1.605	0.109	-0.093		Not Supported
GDP <-- FBB	2.103	0.454	4.629	***	0.776		Supported
GPP <-- FBB	1.754	0.387	4.536	***	0.862		Supported
GPS <-- FBB	0.933	0.224	4.159	***	0.729		Supported
GLP <-- FBB	2.164	0.468	4.628	***	0.697		Supported
GMP <-- FRS	0.004	0.057	0.064	0.949	0.004		Not Supported
GDP <-- FRS	-0.022	0.058	-0.375	0.708	-0.022		Not Supported
GPP <-- FRS	-0.039	0.047	-0.829	0.407	-0.052		Not Supported
GPS <-- FRS	0.004	0.034	0.109	0.913	0.008		Not Supported
GLP <-- FRS	0.124	0.069	1.787	0.074	0.108		Not Supported
GMP <-- CAD	0.014	0.071	0.191	0.848	0.012		Not Supported
GDP <-- CAD	-0.049	0.072	-0.68	0.497	-0.038		Not Supported
GPP <-- CAD	-0.076	0.059	-1.289	0.197	-0.08		Not Supported
GPS <-- CAD	-0.022	0.042	-0.509	0.611	-0.036		Not Supported
GLP <-- CAD	-0.068	0.087	-0.789	0.43	-0.047		Not Supported
GMP <-- CIP	-0.112	0.052	-2.135	0.033	-0.145		Supported
GDP <-- CIP	-0.155	0.055	-2.805	0.005	-0.177		Supported
GPP <-- CIP	-0.058	0.044	-1.312	0.19	-0.088		Not Supported
GPS <-- CIP	-0.087	0.034	-2.568	0.01	-0.21		Supported

GLP	<--	CIP	-0.152	0.065	-2.342	0.019	-0.152	Supported
GMP	<--	NEI	-0.242	0.072	-3.346	***	-0.28	Supported
GDP	<--	NEI	-0.273	0.081	-3.37	***	-0.28	Supported
GPP	<--	NEI	-0.187	0.067	-2.801	0.005	-0.255	Supported
GPS	<--	NEI	-0.053	0.043	-1.244	0.213	-0.115	Not Supported
GLP	<--	NEI	-0.194	0.09	-2.15	0.032	-0.173	Supported
CMIN (X ²)			= 1691.069				DF	= 710
CMIN/DF (X ² /df)			= 2.382				TLI	= 0.781
CFI			= 0.801				RMSEA	= 0.058

3.5.4 Analysis

As reported in Table 3, independent variable; management and staff commitment (MSC), financial and business benefit (FBB), firm resources (FRS), consumer awareness and demand (CAD), competitor influence/pressure (CIP) and national environmental regulations influence (NEI), and dependent variable green adoption practices (GAP) that is, green management practices (GMP), green design practices (GDP), green promotion/selling (GPS), green purchasing practices (GPS) and green logistics practices (GLP) are analyzed to know the relationship existing among them. Testing hypothesis was done through Structural Equation Model and using AMOS 24.0 which presents several positives as compared to other alternative testing mechanisms. Relationships between independent and dependent variables were carried out on constructs.

Table 3 shows that management and staff commitment marginally supports the hypothesis 1a to some extent as it has a significant effect on Green Design adoption with p-value of 0.03 at 0.05 significance level. It however failed to affect all other green adoption practices. It can be concluded that, MSC has an effect in green adoption practices but in a weak manner.

Financial and business benefit on the other significantly affected the green adoption practices as all p-values are below the statistically accepted 0.05 significance level. This lends support to Hypothesis 1b that FBB has a significant effect on GAP.

Surprisingly, one of the studied constructs of firm resources significantly affected GAP as all p-values recorded are above the statistically significant level of 0.05 hence, hypothesis 1c wasn't supported.

Again, it can be observed from Table 3 that Consumer Awareness and Demand (CAD) does not support hypothesis 1d. In other words, there was no significant evidence of positive effect of it on GAP implementation. This is because all the P-values are above the accepted significant level of 0.05, an implication that CAD has no effect on the probability of firms adopting green practices.

Compared to the other independent variables, competitor Influence/pressure was found to support hypothesis 1e. CIP was found to influence practices such as green management, green design, green promotion/selling and green logistics at P-values of 0.0033, 0.005, 0.01 and 0.019 respectively at 0.05 significant levels. However, CIP failed to affect green purchasing at the accepted significant level of 0.05.

A positive effect was established between National Environmental Regulations Influence (NEI) and implementation of GAP. Adoption practices such as GMP was positively influenced. GDP was equally influenced positively and significantly by NEI as observed from Table 3. GPP was also seen to be significantly influenced by NEI with p-value of 0.005 at 0.05 significance level. NEI again had a positively significant effect on GLP with a p-value of 0.032 at 0.05 significance level. However, a non-significant relation was observed between NEI and GPS which recorded a p-value of 0.213 at 0.05 significance level; an indication that NEI does not influence the adoption of green logistics. It can be concluded therefore that NEI supports our hypothesis 1f.

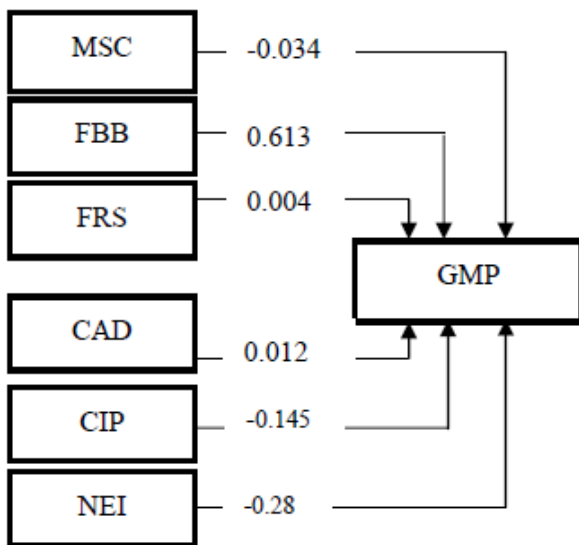


Figure 2. Drivers and green management practice

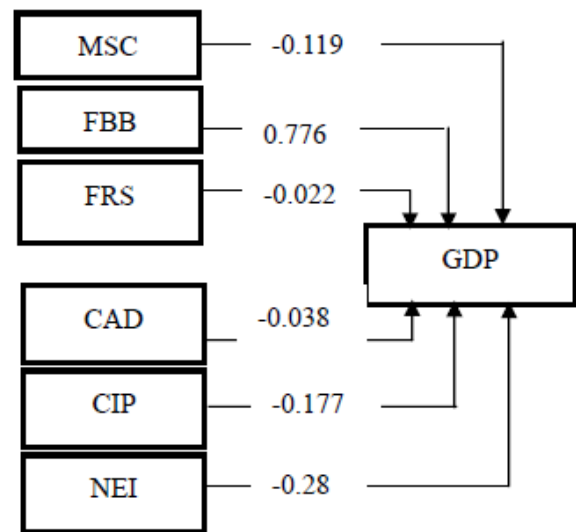


Figure 3. Drivers and green design practices

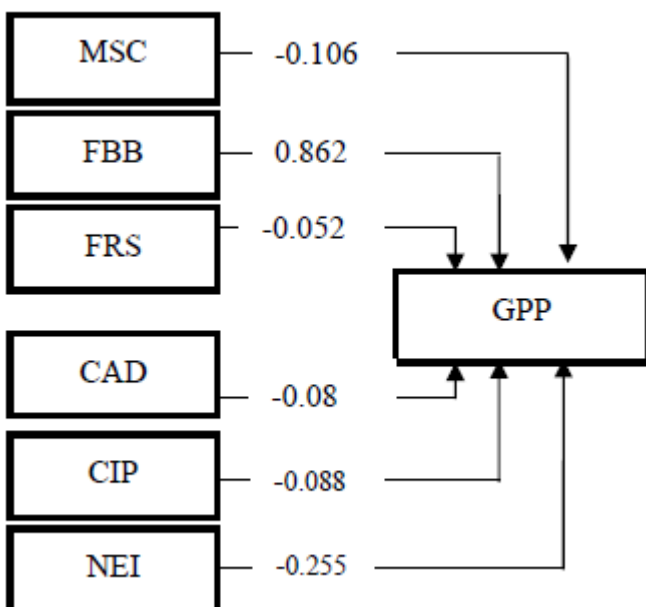


Figure 4. Drivers and green purchasing practices

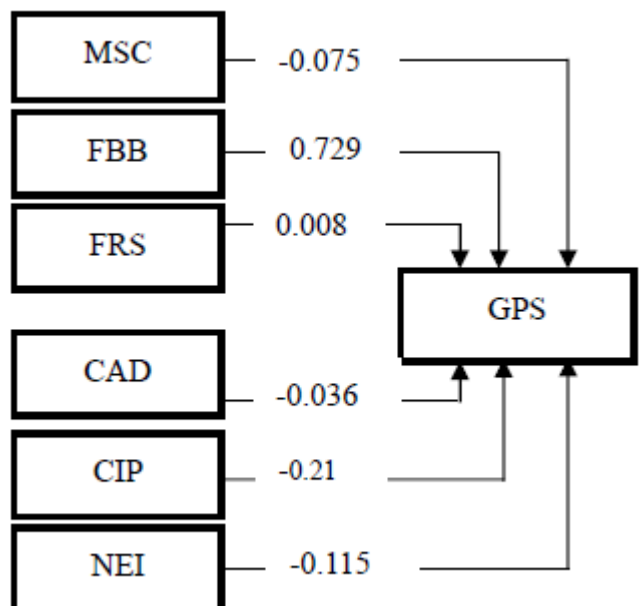


Figure 5. Drivers and green promotion/selling

Figures 2 through 6 show the degree of influence of drivers on various green adoption initiatives. It can be seen that, MSC had weaker influence on all the green adoption practices, implying that it hardly influenced the firms to adopt green practices. Again, from the results it can be seen that, FBB had a relatively stronger positive significant degree of influence on the firms' adoption of green practices, implying that economic and business benefits such as profits, increased market share makes firms adopt eco-friendly initiatives. It can also be observed that, FRS did not have any major influence on firms' decision to go green. This implies despite a firm's resources, it may not adopt green practices but probably, only when complemented by other motivators, whilst it may also be due to the reason that cost of resources to implement green initiatives may deter them from adopting. CAD was also observed to have not actually influence decision to adopt four of the green practices. However, it had a positive insignificant effect on influencing adoption of GMP. The reason could be that, there is less awareness on environmental matters among many consumers within the research location; hence less pressure come from them to manufacturers to demand for green products. CIP was equally observed to have recorded low standard coefficients against the green adoption practices, although it had significant relationships with the practices, indicating that CIP despite its statistical significance was weak in influencing adoption of green practices. Finally, NEI as can be seen from Table 3 recorded statistical significance with green practices but showed weaker degree effects influencing on adoption of the green practices.

4. Discussions

It is evident from the analysis that though management and staff commitment (MSC) did not fully impact green adoption practices, it partially impacted it at one point such as green design of products and processes at p-value of 0.03 at 0.05 significant level by firms. This is in consistence with the study of Park and Kim (2014) which revealed that owner-manager attitudes significantly relates to green adoption. Also supporting our findings is that of Luthra et al. (2016) that concludes that green design adoption is dependent on firm's internal management, customer management and supplier management. However, all the other constructs were non significant in relation to the green practices at 0.05 significance level.

The study suggests that, financial and business benefit (FBB) is a major motivator for firms to integrate green adoption practices. A careful look at the results shows that, it significantly affects all the green adoption practices at 0.05 significance level. This outcome is in agreement with previous studies (eg. Ramakrishnan et al., 2015), that expressed that perceived benefits had positive and significant impact on green adoption practices such as green purchasing in SMEs.

Concerning the effect of firm resource drivers on green practices inclusion in firms, our results failed to validate its significance on adoption at 0.05 significance level. This non significance is consistent with previous study (eg. Aboelmaged, 2018). It was equally in agreement with other findings (eg. Routroy & Kumar, 2016) which observed that, resources such as technology infrastructure and competencies have no influence on adoption of green practices.

In this current study, it was observed that consumer awareness and demand (CAD) had no significant effect on adoption of green practices at 0.05 significance level. However, findings in other previous studies established a positive relationship between CAD and green practices. The current practices thus support the work of Weng et al. (2015). Again, it is contrary to other findings (eg. Aboelmaged, 2018) which found customer environmental pressure to affect green initiatives adoption.

Influence from competitors within the industry was also seen to have a positive effect on green adoption initiatives. Desire of firms to increase market share and profit, and stay in business are among the motivations for firms to implement green practices in their operations. Our results show that, competitor influence and pressure (CIP) had appreciable significance on green adoption at 0.05 significance level except against green promotion/selling that had a p-value of 0.19 at 0.05 significance level. The positive effect on green adoption supports the findings of Abdul-Rashid et al. (2017) that found similar results in their study on drivers for adoption of sustainable practices in Malaysia. Cai and Li (2018) also found that competitor pressure is a primary influencer of eco-innovation, thus showing consistence between their works and the current study. Again, the findings agrees with the outcome of Aboelmaged (2018) who found that competitive pressure impacts the decision to implement green initiatives in small and medium firms.

Institutional theory stipulates that coercive pressure compels firms to adopt environmentally friendly initiatives. Firms are expected to apply technologies that protect the environment and cut down environmental waste, while reporting their pollution emissions to appropriate quarters, failure to comply might attract legal penalty on the firm. From stakeholder theory context, firms are expected to operate to meet the expectations of stakeholders. From our results, national environmental regulations and CSO influence (NEI) shows a significant effect on green adoption practices in the firm. At a significance level of 0.05, NEI showed positive relationship with all adoption practices except against green promotion/selling which had a p-value of 0.213 at 0.05 significance level. The outcome is consistent with the outcome of Abdul-Aziz et al. (2018) that investigated the level of green initiative adoption and its effect on environmental performance in Malaysian listed firms. Similar agreement exist between our outcome and Luthra et al. (2014d) that stated that national and international environmental regulations have a significant impact on Indian auto firms adopting green purchasing initiatives. Our results again supports the results of Shankar et al. (2016) that validated the role of environmental laws and rules in affecting green adoption practices implementation in firms. However, our findings were in contrast with the outcomes of Aboelmaged (2018) which exhibited no positive between national environmental regulations and green adoption practices.

5. Conclusion and Implications.

On the whole, certain factors are necessary to drive or compel firms to adopt environmentally friendly practices that have minimal or no effect on the environment. Relationships exist between the motivators and the practices that are adopted among SMEs. Some of the drivers are internal to the firm whilst others are external to the firm. However, the empirical results from this study show that not all the perceived motivating factors actually have significant

and positive effect on the integration of adoption practices in agro-processing SMEs in Ghana.

This research studies the motivators and the effect on adoption of green practices by analyzing empirically, data gathered from 415 small and medium enterprises engaged in agro-processing in Ghana. We add to the extant literature backed by framework that links our independent variables to the dependent variable. The study makes available practical implications to industry players and policy makers.

The study shows that MSC affected the adoption of GDP but failed to affect the adoption of GMP, GPP, GPS and GLP. The possible explanation could be that SMEs in Ghana are mostly sole proprietorship or family owned with no managerial structures to affect changes within the firm. However, with or without management, owners will be forced to design products that are eco-friendly when other factors such as competitors or national environment regulations, compel them to do so.

Secondly, financial and business benefits has been seen to be a strong driver for the adoption of green practices among agro-processing SMEs in Ghana as it was found to influence the adoption of all the eco-friendly practices observed in this study. Here again, the possible reason could be that every business person or investor has a profiteering motive and any SME owner in Ghana is no exception. Being convinced that adopting green practices will inure to the financial and general benefits of their firms, they will integrate these practices in their business.

Also, firm resources was seen not to influence agro-processing SMEs in Ghana to go green and the explanation to this could be lack of financing to procure green processing equipment, technology and training to meet this new trend, hence the reluctance to adopt.

The consumer in Ghana way probably not have enough awareness on the dangers of the production process of goods on the consumer and this end of life state of the environment, hence hardly do they demand eco-friendly agro product from manufacturers. In this case, manufactures hardly felt any pressure to include environmental standards in their products and processes, thus confirming why consumer awareness and demand may have failed to drive adoption of green practices in the research location and sample.

To survive in any industry requires the industry players to perform better than competitors or match them. When agro-processing SMEs in Ghana realize that their competitors have implemented certain initiatives that give them competitive advantage, results in this study shows they will also adopt same or similar initiatives to survive in the business environment, a possible explanation for the effect of competitor influence or pressure on adoption in this study.

The effect of national environmental regulations on green practices by firms has mostly been positive despite some contrary outcomes in some studies. The positive effect was evident in this current study. This could be linked to the fact that the laws and regulations on the environment compel them to do everything possible to supply eco-friendly products through eco-friendly processes. Knowing that breaching these regulations comes with significant losses including fines, legal action and possible revocation of operating license, firms are compelled to comply and adopt green practices for environmental safety.

This study has some implications as well. From managerial content, SMEs and firms in agro-processing in Ghana should strive to upgrade and innovate on best initiatives on that will compel competitors to mimic some (mimetic pressure) for the good of the environment while reaping accompanying business benefits. Firms again need to position themselves to attract financing from investors to enable them finance required for integrating green initiatives in their operations.

Though SMEs and for that matter those in Ghana are mostly one man owned, owners must be educated to appreciate that they can still initiate eco-friendly practices into their operations. The non significance of customer awareness and pressure suggests that, civil society organizations and government need to sensitize the public on the dangers of environmental products and processes on the environment and the need to demand eco-friendly products and practices from manufacturers to compel them into adoption.

The significance of environmental regulations points, to the fact that policy makers in Ghana ought to regularly review, strengthen and enforce these regulations to check adherence by manufacturers to protect the environment. A careful look at the results shows that only two drivers (FBB and NEI) supported the adoption of green procurement or purchasing of materials from suppliers. Therefore, specific regulations if necessary must be made in respect of material purchasing to exert pressure on firms to also exert pressure on suppliers for eco-friendly suppliers along the supply chain.

Again, despite the findings and conclusions, it cannot be denied that this study may have some limitations that may necessitate further investigation into them. Our study used questionnaire and qualitative analysis to test the hypothesis on drivers. We identified six drivers for this study based on literature and expert opinion in the Ghanaian SME context. Other drivers may exist, and so succeeding studies should delve into these other drivers as related to other developing nations or Ghana.

Again, our sample was restricted to SMEs only. Therefore, large firms in the agro-processing industry were not captured. The motivations for adoption among these two firm types are likely to differ thereby necessitating further investigations.

Also, our research focused on manufacturing sector. However, service sector could also go green. Therefore, future research could investigate how the findings of this study could be applied for the service sector.

Lastly, our data were collected from three out of ten regions in Ghana. Future studies may expand the regional sample or even capture the entire country for a wider conclusion.

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Glossary

AMOS	Analysis of a moment structure
AVE	Average Variance Extracted
CAD	Consumer awareness and demand
CIP	Competitor influence or pressure
FBB	Financial and Business Benefits
FRS	Firm's Resources
GAP	Green Adoption Practices
GDP	Green Design Practices
GLP	Green Logistics Practices
GM	Green manufacturing
GMP	Green Management Practice
GPP	Green Purchasing Practice
GPS	Green Promotion/Selling

MSC	Management and Staff's GM Commitment
NBSSI	National Board for Small Scale Industry
NEI	National environmental regulations influence
RBV	Resource-Based View
SME	Small and Medium Enterprise
SPSS	Statistical Package for the Social Sciences

Appendix 1

SECTION A: Firm's Basic Information

Please answer the following questions concerning information about your organization.

- How long your firm has been operating?
 A. < 10 years B. 10– 20 years C. > 20 yrs
- What is the size of the staff of your company?
 A. < 10 B. 10 – 20 C. 20 – 30 D. > 30
- Is your firm registered with any environmental management body?
 A. Yes B. No
- Does your firm have environmental management unit?
 A. Yes B. No
- Does your firm have an environmental management policy?
 A. Yes B. No

B. SECTION B: Anticipated drivers of Green manufacturing (GM) integration in a firm.

Please rate the following factors which drive your firm to integrate environmentally friendly manufacturing on a scale from 1 to 5; where '1' means non driver and '5' means very high driver by √ mark in the appropriate box.

Driver	Questionnaire items	(1)	(2)	(3)	(4)	(5)
Management and staff's GM commitment	<p>a. Environmental matters in my firm handled as business matters will drive GM adoption.</p> <p>b. Our firm's top management and staff commitment for GM noticed by all will drive its adoption</p> <p>c. Our firm having clear environmental policy and management system will drive GM adoption</p> <p>d. Periodic environmental audit in our firm will drive GM adoption</p>					

Financial and Business Benefits	and	a. Green direct investment by investors will drive our firm's GM adoption b. Expectation of green products' high marketability will drive GM adoption in our firm c. Cost effectiveness of green processes will drive our firm's GM adoption
Firm's Resources		a. Trained and skilled employees in our firm will drive GM adoption b. Expectations of green financial institutions will drive GM adoption. c. Availability of green technology in our firm will drive GM adoption.
Consumer awareness and demand	and	a. Desire to gain public recognition and customer goodwill will drive GM adoption in our firm b. Customer expectations of our firm to meet environmental protection regulations will drive GM adoption c. Readiness of consumers to pay more for green products will drive GM adoption d. Pressure from suppliers demanding green standards from our firm will drive GM adoption e. Customer awareness and demand for green products will drive our firm's GM adoption
Competitor influence or pressure	or	a. Competitive advantage over conventional manufacturing competitors will influence our firm's GM adoption. b. Manufacturing of green products by competitors will influence are firm's GM adoption d. Business association with green competitor firms will influence our firm's GM adoption
National environmental		a. Imposition of fines, penalties and legal costs influences our firm's

regulations and Civil Society Groups' influence	compliance to eco-friendly regulations and adoption of GM. b. Strict environmental and manufacturing regulations will influence our firm's GM adoption c. Demand from community for safer and cleaner environment will drive our firm's GM adoption d. Pressure and creation of awareness by civil societies, green movement and NGOs will influence our firm's GM adoption
Green Management Practice (GMP)	a. Environmental collaboration with customers b. Total quality environment management practices Implementation c. Reward & incentives for environmental initiatives taken by employees d. Commitment & support for green practices from top management
Green Design Practices (GDP)	a. Substitution of polluting & hazardous material/components b. Design for recycling c. Green product development practices d. Design for environment
Green Purchasing Practices (GPP)	a. Providing design specification to suppliers/vendors including environmental requirements b. Purchasing products that have environmentally friendly attribute (recyclable content, nontoxic etc.) c. Motivation for environmental friendly suppliers/vendors
Green Promotion/Selling (GPS)	a. Sale of excess inventories/materials b. End of life product management c. Sale of scrap & used material

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|--|--|
| Green Logistics
Practices (GLP) | <ul style="list-style-type: none">a. Remanufacturing of components or productsb. Reusing/recycling of materials or components or productsc. Use of environmental friendly transportationd. Use of environmental friendly distribution |
|--|--|
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