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Negotiation Variables and Strategies for Integrating Business Negotiations

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ABSTRACT

This paper attempts to present basic factors affecting international business negotiations and present some suggestions for business outcomes. Cultural differences can influence business negotiations in significant and unexpected ways. Business negotiation situational factors and process factors in integrative negotiation approaches are analyzed and some efficient negotiation strategies for achieving higher negotiation outcomes are presented.

I. Introduction

Negotiation is an exchange activity which promotes the possibility of mutually beneficial outcomes. The negotiation activity is a unique encounter because of the simultaneous presence of the elements of cooperation and conflict. The negotiator is motivated to cooperate in order to secure some joint outcome. Negotiation is the process by which people attempt to settle what each shall give and take or perform and receive in a transaction between them. Negotiation is a critical business process as it is necessary whenever people are dependent on one another for accomplishing objectives.

When a negotiation takes place in an intercultural situation, cultural diversity as well as a language barrier will be added to the complexity of domestic negotiations. Because each nation has its own more or less unique culture, different protocol and tactics in business negotiations could create obstacles in marketing an agreement which satisfies both parties. Furthermore, a prolonged negotiation period will result not only in depletion of business resources such as time, money and opportunity, but also in a loss of mutual trust due to its failure to arrive at an agreement. Differences can be a factor of intercultural communication complexities and a source of problems, but they ultimately become the primary resources in creating a mutually beneficial, synergistic agreement. Negotiation is generally the preferred strategy for creating win-win solutions in most cultures because differences become a resource in creating new solutions. Therefore, mutually beneficial solutions will be reached when negotiators focus on their comparative advantages.

In international business negotiations, cultural differences are inevitable between negotiators from

different countries. Cultural values can influence international business negotiations in significant and unexpected ways from the first to the last stage of a negotiation. The diversity of values of partners results in different approaches used in the negotiation process and variable expected outcomes. Successful international business negotiation is not guaranteed by practical negotiation tips only. In fact, it would be more useful for negotiators if the most critical success factors of international business negotiations in a particular culture could be identified in advance.

Negotiating with businessmen from different cultures requires an understanding of and adaptability to these differences. Special approaches for particular cultures may be needed. Negotiation is the most common means of managing the inevitable conflicts which arise between business organizations. Increasingly, commercial relationships span both political borders and cultural boundaries, yet we know little about negotiations in different cultures. A lot of international business is done by face-to-face negotiations. International business such as joint ventures, mergers and acquisitions, licensing and distribution agreements and sales of products and services are usually carried out through face-to-face negotiations.

Numerous cross-cultural endeavors end in failure due mainly to a negotiator's inability to accept and adapt to the underlying beliefs of the other party (Currie, 1991). Since international business negotiations are more complex than domestic business negotiations, due largely to this added dimension of cultural diversity, one proposed solution to the limitation of principled negotiating is the synergistic approach (Addler, 1991). The culturally collaborative synergistic style of negotiation emphasizes that understanding the other parties, their interests and their assessment criteria becomes more difficult due to cultural and communication differences. However, the diversity of culture may enhance the generation of creative options for mutual gain. Based on the assumptions, synergistic negotiation suggests that if cross-cultural differences are recognized, clearly communicated and understood by the negotiator, they can be the basis for constructing win-win agreements. This study will examine the basic variables affecting the outcomes of face-to-face business negotiations and will also suggest some efficient negotiation strategies for international negotiators

II. Variables Affecting the Outcomes of Business Negotiation

2.1. Culture

Culture has a profound impact on how people in the marketplace perceive and behave. The level of aggregation of this construct, however, has always been somewhat problematic. In the realm of international marketing, culture has been typically visualized at the national level. However, organization within the national context had been difficult because of a wide divergence of definitions, each reflecting different paradigms form varying disciplines. In this regard, Hofstede's four dimensions of culture appear most promising. They are based on empirical research, and thus offer the advantage of quantifiability. Hofstede defines national culture as the "collective mental programming" of people in an environment.

Individualism/Collectivism. Individualism describes the relationship between an individual and his or her fellow individuals, the collectivity which prevails in society. One extreme contains societies with very loose ties between individuals. Such societies allow a large degree of freedom, and everybody is expected to look after their own self-interest. At the other end are low individualism societies, for example, societies with very strong ties between individuals forming the in-group. People are expected to watch after the interests of their in-group and to hold only those opinions and beliefs sanctioned by the group. The United States, Great Britain, and Netherlands display strong individualism, while countries such as Colombia, Pakistan, and Taiwan gravitate toward the other extreme.

Power Distance. In negotiations, power and social status are considered equal. Power distance involves a society's solution to inequality. People possess unequal physical and intellectual capabilities, which some societies allow to grow into inequalities in power and wealth. Some other societies, those characterized by a small power distance, de-emphasize such inequalities and strive toward

maintaining a relative equity in the distribution of power, status and wealth. The Philippines, India, and France all display relatively large power distance. Austria, Israel, and Denmark depict relatively small power distance, while the United States lies mid-range in the power distance continuum.

Masculinity/Femininity Dimension. Masculinity pertains to the extent to which societies hold values traditionally regarded as predominantly masculine or feminine. Examples of masculine values include assertiveness, respect for the super-achiever, and the acquisition of money and material possessions. Feminine values include nurturing, concern for the environment, and championing the underdog. Japan, Austria, and Italy are examples of typically masculine societies while Norway, Sweden, the Netherlands, and Denmark show strong feminine characteristics.

Uncertainty Avoidance. Weak uncertainty avoidance societies socialize members to accept and handle uncertainty without much discomfort. People in these societies tend to accept each day as it comes, take risks rather easily, and show a relatively greater tolerance for opinions and behaviors different from their own. Strong uncertainty avoidance societies feel threatened by ambiguity and uncertainty. Such societies emphasize the strong need to control an environment, event, and situations. Based on Hofstede's research, Belgium, Japan, and France display strong uncertainty avoidance. Denmark, Sweden, and Hong Kong could be characterized as weak uncertainty avoidance societies. The United States is somewhat in the middle.

Culture has mostly an indirect influence on the outcome of negotiations (Graham & Sano, 1990). It works through two basic groups of mediating variables: situational aspects of the negotiation (time and time pressure, power and exercise of power, number of participants, location, etc.) and the characteristics of the negotiators (especially personality variables and cultures). These two groups of factors, in turn, influence the negotiation process, which ultimately determines the outcome (Jolibert, 1988).

One way to understand intercultural negotiation is to compare cultural preferences for communication patterns as proposed by Hall (1976) and by Kaplan (1966), who link cultural norms to communication and linguistic patterns. Kaplan argues that thought patterns and linguistic styles are reciprocally determined. The English language and its related thought patterns have, for instance, evolved out of the Anglo-European cultural pattern. Related thought and communication patterns are characterized by a linear and direct discourse. Additionally, the Anglo-European culture is characterized by analytical and systematical problem solving and people of this culture prefer to solve problems linearly, one problem after another, in a monochronic time orientation. However, Asian thought patterns (for example, Chinese, Korean) are circular and indirect. Problem solving tends to be more person-oriented and, in contrast to the analytical Western approach, intuition is given more weight in these cultures.

Hall (1976) extends Kaplan's work and distinguishes between low-context and high-context cultures to describe cultural differences in communication patterns. He describes how much information needs to be coded and explicitly transmitted in a message to be efficient in different cultures. According to Hall, in low-context culture like the United States or Western European countries, there is only a small amount of shared and implicit information carried in the context of an event. This creates a significant need for contexting during negotiation. Low-context cultures are more explicit as they prefer a direct and linear discourse in negotiation. To the contrary, in high-context cultures like in Latin-American or Eastern or Asian countries, most information is either contained in the physical context of an event or internalized in the persons. Less information needs to be coded explicitly in communication to be effective. These implicit cultures prefer indirect and circular communication patterns.

2.2. Situational Factors

Grumperz (1979) suggests that while humans are interacting, they also provide stylistic signals for the interpretation of verbal communications through the use of what he calls contextualization cues.[1)] An example of a contextualization cue might be a rise in tone of voice to indicate or underline an important point. Grumperz and his associates have also found that contextualization cues vary

across cultures. They are behaviors learned in the course of the individual's socialization. Further, he suggests that differences in these cues are often the cause of misunderstandings which can have serious consequences in cross-cultural interactions.

Elements of conversational form that have been found to vary across cultures are legion. For example, Graham (1985) reports Brazilian negotiators appear to have more aggressive conversation than Japanese or American negotiators. In simulated negotiators, Brazilians used the words 'no' and 'you' more frequently, the former providing a negative tone, the latter providing a presumptuous tone vis-a-vis the Japanese and American behaviors. The Brazilian nonverbal behaviors also differed from the Japanese and Americans: no silent periods and far more interruptions and facial gazing occurred.

A variety of situational factors might act as determinants of outcomes of business negotiations: for example, company goals, location, number of parties. Culture has been a difficult concept to deal with in any consistent, scientific way. A culture is a configuration of learned behaviors and results of behavior whose component parts are shared and transmitted by the members of a particular society (Linton, 1945). The important part of the definition for the present research is the idea that behaviors are shared by members of a particular culture. According to Spiro (1950), members of a given society behave in uniform and predictable ways. In addition to bargaining behaviors being consistent within cultures, several authors have suggested that negotiations processes differ across cultures.

2.2. Process

2.2.1. Problem-Solving Approach

The problem-solving approach (PSA) to business negotiation is defined as a set of negotiation behaviors that are cooperative, integrative, and information exchange-oriented. PSA involves an emphasis on questions and getting information from clients about their needs and preferences. The problem solving approach to negotiations first involves an emphasis on questions and getting information from clients about their needs and preferences. Second, once the client's requirements and circumstances are fully understood, the negotiator accommodates the offering to the client's needs. The focus is on cooperation and an integrative approach, wherein the needs of both parties are honestly discussed and eventually satisfied. A PSA can be concisely defined as a set of negotiation behaviors which are cooperative, integrative and information-exchange oriented. Such strategies tend to maximize the number of alternative solutions considered, thus allowing negotiators to optimize outcomes. The relationship between a problem-solving approach and negotiation outcomes has been frequently investigated during the last twenty years. Different researchers have used various labels for the PSA concept (e.g., integrative bargaining strategies-Walton and McKersie (1965); cooperative orientation -Rubin and Brown(1975); Williams(1983); Problem-solving orientation-Pruitt and Lewis(1975), Murray(1986). Most of findings have been relatively consistent. Generally a PSA has been found to positively influence negotiation outcomes. Graham (1986) investigated relationships between a PSA and a negotiator's individual profit and their bargaining partner's satisfaction. Consistent with several studies reviewed by Rubin and Brown (1975), statistically significant relationships were discovered between a negotiator's PSA and the negotiator's individual profit. Negotiators who encourage partners to provide information about themselves and their needs and preferences can be expected to achieve more favorable negotiation outcomes. Rubin and Brown (1975) and Weitz (1979) suggest the importance of adjusting one's negotiating tactics according to one's impressions of the opponent's negotiation style. Specially, Weitz suggests that adaptive behavior will enhance negotiating effectiveness. Rubin and Brown posit high adaptability coupled with cooperativeness will favor higher negotiation outcomes.

2.2.2. Interpersonal Attraction

In addition to the negotiating strategies, interpersonal attraction such as like or dislike, a friendly or unfriendly feeling can strongly influence current negotiation outcomes and the success of future transactions. Simons, Berkowitz and Moyer (1970) suggest the relationship

between attraction to a source such as like or dislike, a friendly or unfriendly feeling and attitude change has received scant attention. Rubin and Brown (1975) conclude in their review of the negotiation literature that generally interpersonal attraction enhances negotiating outcomes. Negotiating partner's satisfaction has been found to be positively related to a negotiator's attractiveness for business people from France and Germany (Campbell et al. 1988), from America, Taiwan, Japan and Korea (Graham et al. 1988), and from Canada and Mexico (Adler et al. 1989). McGuire (1968) explains that when people are attracted to each other, they will make sacrifices (i.e. concessions in a negotiation) to preserve the gratifying relationship. Thus, an individual negotiator may give up economic rewards for the social rewards of a relationship with an attractive partner.

In the very relevant field of buyer/seller interactions, Evans' (1963) similarity hypothesis posits that the more similar individuals are in buyer/seller relationships, the more favorable will be the outcome and the more likely a sale. Mathews, Wilson and Monoky (1972) argue that perceived similarity results in more cooperation between buyer and seller. Attraction is the mechanism through which similarity affects these outcomes.

It should be noted that interpersonal attraction might be conceived as an exogenous construct determined before negotiations begin as a part of the combination of the negotiator's characteristics. It may also argued that attraction is a consequence of the negotiation. However, attraction is regarded as a process-related construct.

There is abundance of studies in the negotiation literature that focus on the fundamental assumption that personal parameters or negotiators' characteristics are relevant to negotiation processes and outcomes (Barry and Friedman, 1998). Someone with a trusting nature tends to give credence to honesty if statements of others unless or until reasons are provided for disbelief. In negotiation, trust relates to how they expect their partners to behave and respond (Fells, 1983). Negotiators who are inherently suspicious tend to behave more competitively during the negotiation, while trusting negotiators are more likely to share and/or exchange information (Butler, 1995). The sharing of information among negotiation partners is an important prerequisite for the problem solving approach. As a result, trusting negotiators are more apt to demonstrate PSA behaviors.

2.2.3. Time

In the cross-cultural negotiation literature, duration of the negotiation is described as a key aspect of the process. For example, Tung (1982) and Van Zandt (1970) report that negotiations with Chinese and Japanese are exasperatingly long from the perspective of most American negotiators. Pruitt(1981) discusses at great length the pervasive influence of time on negotiations. That is, a time limit affects the qualities of aspirations, concession making, and negotiation satisfaction. Although time limits per se are not varied in this study, negotiators from different cultures may have different expectations about appropriate durations, which may in turn influence behaviors.

2.2.4. Role of the Negotiator

Graham *et al.* (1988) found the negotiator's role (i.e., buyer or seller) to be the most important causal factor in negotiations. Hall (1976) provides a rationale for the importance of role constraints. He describes communication context to be crucial dimension of culture. Schmidt (1979) suggests that status is a particularly important factor in negotiations among Chinese in Taiwan. Similarly, Coates (1968) suggests the importance of role and status hierarchy among the Chinese in Hong Kong.

2.3. Nonverbal Negotiation Behavior

Communication theory suggests that when two people are effectively sharing ideas, their communication behaviors, both verbal and nonverbal, will be rhythmically coordinated (Gumperz, 1979).

2.3.1. Silent Period

Silent periods are operationally defined as gaps in conversations lasting 10 seconds or more in duration. The time period of ten seconds was selected somewhat

arbitrarily, but it is a long enough period of silence to appear unnatural to most observers. The tapes were searched for gaps in conversations of ten seconds or more. Negotiators from a low context culture such as America tend to regard the silence of high context culture such as Korea as a rejection, which is not a rejection in a real sense by their standards.

2.3.2. Conversational Overlaps

The concept of interactional synchrony, the unconscious coordination of verbal and nonverbal behaviors of 2 or more participants in a conversation, was discussed at length by Graham (1980). It is the number of conversational overlaps or interruptions during a conversation. Conversational overlaps are defined as periods when both speakers are talking at the same time, or when the conversational contribution of one speaker overlaps that of the other speaker. One possible measure of this construct is the number of conversational overlaps or interruptions during a conversation. Identification of such overlaps is independent of the verbal content of the interactions.

2.3.3. Facial Gazing

Facial gazing is defined as the percentage of time a negotiator gazes at the face of the partner. Many researchers have found significant relationships between facial gazing and outcomes of negotiations (Lewis and Fry, 1977). Moreover, several authors have suggested differences in facial gazing behavior across cultures (Argyle and Cook, 1976).

2.3.4. Touching

Touching means that negotiator touches another negotiation partner with the exception of beginning and ending handshakes. It is the number of times negotiators touch their partners (excluding beginning and ending handshakes). Graham (1985) reports Brazilian businesspeople touch one another during simulated negotiations while Japanese and American negotiators do not.

2.4. Negotiation Outcomes

Researchers often find outcomes of business negotiations difficult to measure and to compare. Various studies have used sale versus no sale, an obvious measure of negotiating effectiveness (e.g. Pennington, 1968), profits obtained by negotiators (e.g. Rubun & Brown, 1975), and a combination of individual and joint profits (Clopton, 1984). Beyond profits, negotiator's satisfaction is an important measure of success, especially if partners desire a continued relationship. Given the dual importance of task accomplishment (profit) and relationship building (satisfaction), especially in international negotiations, the present study uses both as outcomes.

III. Implications for Cooperative Business Negotiations

3.1. Information Exchange

A task related exchange of information implies a two-way communication process. Most importantly, the success of the problem-solving approach among negotiators from different countries would seem to support normative prescriptions regarding the importance of openness and trust-building behaviors among cooperative partners in general. Also, the success of the problem-solving approach for a negotiator depends upon the partner’s response. When partners fail to reciprocate with their own problem-solving behaviors, negotiators’ economic returns are likely to be diminished.

In the United States, negotiators tend to say what they want and explain the reasons behind their requests only if necessary. That’s why the task related exchange of information goes so quickly. This isn’t the ritual in many countries. In Japan, for example, they are used to long descriptions of background and context before specific proposal are made, because the time invested in detailed discussions obviates heavy handed persuasive tactics and yields seemingly obvious answers to negotiation problems. By communicating negotiation interests, a company’s needs and preference will take longer in almost all different

countries. Language problems and lengthy explanations will require more meetings, requiring more of people and more of counterparts. To exchange information, patience with this process and anticipation of increased time and money spent at this stage is required. Also, the most efficient way to get feedback from a foreign negotiator may be through the indispensable intermediary. Having talked about all the difficulties in getting honest feedback from many foreign partners, negotiators should also understand the counterparts' non-verbal behaviors and that some cultures are on the other end of the scale.

3.2. Persuasion

Persuasion is an important phase of business negotiation. In the USA, negotiators have a wide range of persuasive tactics that can be and are often are employed to change counterparts' minds. Among them are promises, recommendations, appeals to industry norms providing more information, asking questions, and more aggressive threats and warnings. However, the appropriateness and effectiveness of these approaches varies in other countries. When persuasion starts in business negotiations in many countries, negotiators can expect to hear about competitors and threats to do business elsewhere. Negotiators from a low-context culture such as the USA tend to be in a hurry and tend to focus on one thing at a time, and the development of a symmetrical set of alternatives begins only when troubles crop up with the focal business deal. Therefore, they feel like they're being two-timed when the "there's-more-than-one-game-in-town" threat is delivered. They are puzzled when negotiators from a high-context culture, such as oriental countries, are blandly pointing out what they believe should be obvious to everyone.

Another important factor in relationship-oriented culture is the context in which specific tactics are used. Aggressive influence tactics, such as threats or warnings, which can be used by negotiators in higher power positions, should be communicated through intermediaries and informally. Only subtle and indirect threats, commands, and so on are appropriate.

3.3. Efficient Negotiation Strategies

First, ask more questions. This is true in not only relationship-oriented cultures, but anywhere in the world. Sometimes, it's smart to be a little bit dumb in business negotiations. Ask questions more than once like "I don't fully understand what you are talking about. Would you be kind enough to explain that again?" If your counterparts' answers are satisfying to the negotiators, a compromise on the issue can be drawn up. Questions often put more information on the table, providing leads toward more creative solutions.

Second, be silent if necessary. If the negotiators are still not satisfied with counterpart's response, try silence. Let the counterpart think about it and give them an opportunity to change their position. However, the negotiators should recognize that the counterparts are often much better at the use of this tactic than the negotiators.

Third, aggressive influence tactics, such as warnings and threats, particularly those emphasized with expressions of emotion, may be used in negotiations in a very restrictive way. They should only be used via the intermediary or local representative, and even then they should be used in the most indirect manner possible. Also, they should be used only when the negotiator is clearly in the stronger position. Even in these two circumstances, use of such aggressive persuasive tactics will damage the interpersonal harmony.

Fourth, change the negotiation subject or call a recess. If an impasse is reached, sometimes it's better to change the subject and have a recess rather than going directly to the more aggressive tactics.

3.4. Concession

The final stage of business negotiation involves concessions and building toward agreement. Negotiation requires compromise. The parties concerned in the negotiation give up something to get even more. However, the approach used for compromise can vary substantially around the world. Negotiators from low-context cultures have a hard time in measuring progress in the negotiations with their counterparts from low-context culture. It's important to document concession strategies. When they are agreed to and written down before negotiations begin, it's easier for everyone to stick to the concession schedule.

Also, concession should not be decided upon at the negotiation table. Specially, trading concessions with foreign negotiators from high-context cultures cannot work because they view nothing to be settled until everything is settled.

IV. Conclusions

The primary purpose of this study has been to find out basic factors affecting international business negotiations and to suggest some strategic implications for business negotiators.

With the advancement of globalization, intercultural business negotiations become more and more important as a marketing strategy. The role of business negotiators is extremely important in order to achieve successful international business negotiations.

In order to achieve agreement in international business negotiations, negotiators are required to manage cultural differences between the parties concerned in addition to the complexity of domestic negotiations. Because such a large variety of cultural factors exist among nations, it is critical for negotiators to identify the kind of problem-solving approaches which are most appropriate for each intercultural negotiator. Understanding cultural differences is vital for successful intercultural negotiations. Objective measurement of a culture is important to overcome misunderstanding caused by stereotyping and prejudice about other cultures.

Therefore, implementing negotiation strategies through business negotiations in other countries, particularly the unfamiliar, but fast-growing ones, remains one of the most daunting and interesting challenges facing international business negotiators.

The problem-solving approach is one of the key constructs in the field of negotiation research. It has proven important in our study as a pivotal aspect of negotiation processes in the three cultures. The most important implication of this study is that problem-solving approach can play an important role in drawing efficient negotiation results.

For getting better negotiation outcomes, the negotiator should understand the cultural background, especially regarding business negotiation. Negotiators can ask more questions in their negotiations. Sometimes, it's smart to be a little bit dumb in business negotiations. The more the negotiators ask questions, the more they can get and exchange information. Also, using a silent strategy can be necessary, and aggressive influence tactics such as warnings and threats, particularly those emphasized with expressions of emotion, may be used in negotiations in a very restrictive way.

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The Relationships between the Firm's Internal and External Environment and Export Marketing Strategy of LDC Firms

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ABSTRACT

This study explored the nature of the relationship between the firm's internal and external environment and the export marketing strategy. The firm's internal environment includes the firm and product characteristics while its external environment pertains to the technology intensiveness of the industry and export market attractiveness. Regression analysis showed the significance of product uniqueness, export customers' product/brand familiarity, commitment to the export venture, extent of regulatory/non-tariff barriers, technology intensiveness of the industry, firm's experience with the product and cultural acceptability as correlates of export marketing strategy.

I. Introduction

A variety of internal and external factors such as firm, product, industry and market characteristics affect the degree of standardization or adaptation of a marketing strategy (Douglas and Wind, 1987; Jain, 1989; Akaah, 1991; Cavusgil, Zou, and Naidu 1993). The more international experience the firm has, the more sensitive it is to the idiosyncrasies of the foreign market, hence it is more likely to adapt its product or promotion strategy (Cavusgil, Zou and Naidu, 1993; Lages, Jap and Griffith, 2008). A less experienced firm looks for foreign market conditions closely matching its offerings such that minimum adaptation is necessary (Douglas and Craig, 1989). An alternative view is that firms can be less inclined to modify products which have long been established with the firm in the belief that their product or promotion strategies have proven to be successful in the past (Cateora, 1990). A firm is likely to standardize strategy when the cultural environment of its home and target countries is similar (Hill and Still, 1984). A culture-specific product may not suit the cultural base in the foreign market (Terpstra, 1987) so to be viable, this product should be adapted to the cultural idiosyncrasies of the export market (Douglas and Wind, 1987). Similarly, a unique product needs greater adaptation to satisfy the needs of the export customers (Hill and Still, 1984; Cavusgil and Zou, 1994).

The adaptation of product and promotion strategies is negatively influenced by technology orientation of the industry (Cavusgil and Zou, 1994). Technology-intensive industries like computers, heavy equipment or aircraft are more likely to have global strategies while less technology-intensive industries like food, clothing and the like whose products appeal to tastes, customs or habits that tend to vary from market to market are more likely to adapt its strategies (Boddewyn, Soehl and Picard, 1986; Jain, 1989).

Firms are more likely to seek a higher degree of product and promotion adaptation when competition in the host market is intense in order to gain competitive advantage (Cavusgil, Zou and Naidu, 1993). Export customers' familiarity with the product or brand can be exploited as this favorable attitude can bring about brand equity (Parameswaran and Yaprak, 1987). Hence, a familiar product/brand does not require a high degree of promotion adaptation.

Management's commitment to exporting is likely to encourage exporters to match competitors' price reduction (Christensen, da Rocha and Gertner, 1987). A competitive pricing strategy is more likely for firms in technology-intensive industries, specifically when technology was used to reduce production costs (Porter, 1980). A firm is also more price competitive when there are less regulatory/non-tariff barriers in the export market.

II. Proposition and Hypotheses

The relationships previously discussed are summed up in the following research proposition:

Proposition: *Export strategy is a function of firm and product characteristics, technology intensiveness of the industry and export market characteristics.*

Table 1 summarizes the hypotheses drawn from the research proposition.

Table 1. Summary of Hypotheses

Internal and External Environment	Product adaptation increases as	Promotion adaptation increases when	Support to foreign distributor/ subsidiary increases when	Price competitiveness increases when
Firm's international competence	increases	increases	---	---
Commitment to export venture	increases	increases	increases	increases
Firm's experience with product	decreases	increases	---	decreases
Cultural acceptability of product	decreases	---	increases	---
Product uniqueness	increases	increases	increases	---
Technology intensiveness	decreases	decreases	increases	increases
Export customers' product/ brand familiarity	decreases	decreases	---	---
Regulatory/ non-tariff barriers	---	---	increase	decrease

III. Research Method

3.1. Data Collection and Key Informants

A sample of 187 firms was drawn from the directory of Philippine exporters. A structured questionnaire was used for the personal interviews with export managers or persons directly involved in the firm's export operations. The majority (37%) of the firms belong to the gifts, toys and housewares industry. The second largest (32%) respondent group was manufactured agricultural and horticultural products. The smallest group in the sample exported electronics, footwear and industrial products. The sample consists mostly of small firms (64%) and large firms (13%). Medium-sized firms comprise 9% of the sample while the rest are micro-size and cottage-size firms.

3.2. Analytical Procedure

Multiple regression analysis was conducted with nine individual measures for environmental categories (e.g., international competence and commitment to export venture under firm characteristics) as independent variables and the composites of the four export marketing strategies as dependent variables.

Using the "Stepwise" method in SPSS, nine predictors representing firm, product, industry and export market characteristics were regressed on four criterion variables which were product adaptation, promotion adaptation, support to foreign distributor/subsidiary and price competitiveness. To better understand which independent variables emerge as important predictors of the dependent variable, separate regression analyses were run for the internal and external environment variables. These two independent models are referred to as the independent (internal) model and the independent (external) model. Then all the internal and external environmental variables were regressed on the strategy variables. The resultant model is referred to as the overall model.

The relative importance of the predictor variables in accounting for the variability in the criterion variable was assessed using the standardized *beta* weights (β).

IV. Results and Discussion

4.1. Determinants of Product Adaptation

Only the firm's internal environment, product uniqueness, commitment to venture and international competence emerged as important predictors of product adaptation (Table 2). When only the firm's external environment is taken into account, only the export customers' product/brand familiarity and level of development of marketing infrastructure came out as important predictors of product adaptation. The coefficient of determination of the independent (internal) model is greater than that of the independent (external) model ($R^2_{internal} = .172 > R^2_{external} = .095$) which suggests that variations in product adaptation are explained more by the variations in the firm's internal environment than those in the firm's external environment.

Table 2. Multiple Regression Results for Export Marketing Strategy with the Internal and External Environment as Separate Groups of Independent Variables

Independent Variables	Dependent Variables Export Marketing Strategy			
Internal Environment	Product Adaptation	Promotion Adaptation	Support to Foreign Distributor	Price Competitiveness
	Beta Weight (t value)	Beta Weight (t value)	Beta Weight (t value)	Beta Weight (t value)

International Competence	.137 (2.020)*	.134 (1.889)†	-.047 (-.661)	-.026 (-.323)
Commitment to Venture	-.176 (-2.608)*	.236 (3.364)*	-.075 (1.065)	.064 (.868)
Experience with Product	-.050 (.647)	.058 (.816)	.038 (.533)	-.147 (-2.015)*
Product Uniqueness	.342 (5.505)***	.194 (2.758)**	.307 (4.388)***	.055 (.745)
Cultural Acceptability	-.070 (-1.016)	-.065 (-.919)	-.138 (-1.971)†	.058 (.794)
R2				
Adjusted R2	.177	.092	.094	.021
F-Ratio	.164 13.131***	.082 9.281***	.089 19.256***	.016 4.060*
External Environment				
Technology Intensiveness	.066 (.932)	.158 (2.224)*	.118 (1.618)	variables do not explain significant variations in the dependent variable
Regulatory/ Non-Tariff Barriers	-.104 (-1.475)	-.028 (-.383)	-.228 (-3.182)**	
Product/Brand Familiarity	.308 (4.402)***	.240 (3.375)**	.108 (1.497)	
R2				
Adjusted R2	.095	.095	.052	
F-Ratio	.090 19.377***	.086 9.707***	.047 10.122**	

***p<.001; **p<.01; *p<.05; †p<.1

However, when both the firm's internal and external environment are considered, three predictor variables (two external and one internal), emerge as relevant considerations for product adaptation (Table 3). They are product uniqueness (β = .309), export customers' product/brand familiarity (β = .272) and commitment to the export venture (β = -.194). The firm's international competence is positively linked to product adaptation but its contribution to the model is not significant.

Table 3. Multiple Regression Results for Product Adaptation with Both Internal and External Environment as a Combined Group of Independent Variables

Independent Variables Internal and External Environment	Dependent Variable Product Adaptation *Beta* Coefficient	*t* value
Product Uniqueness	**.309**	**4.671*** **
Product/Brand Familiarity	**.272**	**4.086*** **
Commitment to Venture	**-.194**	**-2.970** **
International Competence	.081	1.195
Experience with Product	-.005	-.071
Cultural Acceptability	-.059	-.906
Technology Intensiveness	-.012	-.184
R^2	.229	
Adjusted R^2	.216	
F-Ratio	18.130***	

***p<.001; **p<.01

Product uniqueness exhibits the expected positive relationship to product adaptation. However, export customers' product or brand familiarity and commitment to export venture show associations contrary to expectations. The model suggests three things. Firstly, a unique product prompts greater product adaptation to better meet export customers' needs. Secondly, it suggests that product adaptation increases as export customers become more familiar with the product/brand. Thirdly, product adaptation increases when commitment to the export venture decreases. In discussing the first suggestion, it is important to bear in mind the context in which product uniqueness is addressed in this research. Product uniqueness is referred to as the differentiation of the product from competitors' products in terms of process and design exclusivity. The "Think local, go global" Philippine export program theme aims to promote Philippine exports which make use of indigenous materials and showcase Filipino craftsmanship. Christmas decorations top the list of Philippine exports in the Gifts, Toys and Housewares category. These holiday decors are made of local materials which are abundant in the country such as abaca fiber, capiz shells and dried palm leaves, to mention a few. The use of local materials has affected product differentiation, creating uniqueness. In order for these unique products to blend into the preferences in the foreign market and better ensure competitiveness, product modifications through the incorporation of colors, finishes and trimmings favored by the target market were employed. In this context, the more unique the product is, the more adaptation is affected.

The last two suggestions bring forth an issue regarding time lag. The measures for export customers' product/brand familiarity and firm's commitment to the export venture refer to familiarity and commitment at the time of the survey and not at the time the product was launched. While the model states that a high export customers' product/brand familiarity induces more product adaptation, it could be argued that export customers' increased awareness of the product or brand resulted from the product modifications in the past. With regards to the third suggestion, the managers interviewed said that when they first started exporting, the inertia was so great that most of them overdid things in terms of the managerial time allotted to the export activity, including the number of full time export staff and the countries being sold to. This implies that during the early stages of exporting, the levels of commitment to the venture and initial product modification are high showing a positive relationship between commitment and product adaptation. After the experience curve, firms learned to operate with a more optimal level of export staff, managerial time set aside for the export venture and number of countries exported to while maintaining the same high level of product adaptation. This reflects a negative relationship between product adaptation and commitment to the export venture. Another plausible explanation is that the level of subsequent product modification is lower than that of initial product modification. So if firms maintained the initial high level of commitment to the venture when employing subsequent product modification, the relationship between commitment and product adaptation will be negative.

The firm's international competence dropped out of the equation. Although the sign of its *beta* coefficient is in the right direction, its contribution to the model is not significant. The same is true with cultural acceptability and technology intensiveness.

The negative relationship of the firm's experience with the product to product adaptation supports Cateora's (1990) finding that firms are reluctant to modify a product which has long been established with the firm.

4.2. Determinants of Promotion Adaptation

The two promotion adaptation regression models with the firm's internal and external environment variables as separate correlates yielded very low R^2 (9.2% and 9.5%, respectively, Table 2) relative to the model incorporating both environments (R^2 = 15.2%, Table 4). This reiterates the importance of the combined contribution of the internal and external factors in increasing the predictive capability of the model. Three

internal variables came out significant in predicting promotion adaptation in the independent (internal) model (Table 2). They are commitment to the export venture (p<.01), product uniqueness (p<.01), and international competence (p<.1). Two external variables, namely, export customers' product/brand familiarity (p<.01) and technology intensiveness of the industry (p<.05) were found to be relevant to promotion adaptation in the independent (external) model.

The overall model indicates that commitment to the export venture, technology intensiveness, export market customers' product/brand familiarity and product uniqueness are significant predictors of promotion adaptation (Table 4). Firms are more likely to modify their promotional strategy when commitment to the export venture is high, when their product belongs to an industry with high technological orientation and when the product is unique. Contrary to the hypothesis, the result of this study indicates that as the technology orientation of the industry increases, the degree of promotion adaptation increases. This result therefore differs from the finding of Cavusgil (1994) regarding a negative relationship between technology orientation of the industry and promotion adaptation. Apparently, firms whose products belong to industries characterized by high technological advancement modify their positioning strategy and promotional approach to highlight the technological advantage of their products to set them apart from similar products in the export market in an effort to gain a competitive edge. A manufacturer of resin-based decorative items in the Philippines emphasized its products superior quality relative to similar plastic-based and plaster-based products in the export market by selling them only in up-market department stores. It should however be noted that the application of technology varies among countries and among industries. For example, using resin for the manufacture of decorative items requires a different process compared to using indigenous materials like abaca fiber. In this context, the former process is more technology-intensive than the latter.

Again, the issue of time lag arises with regards to the positive relationship between export customers' product/brand familiarity and promotion adaptation. Similar to the argument in the previous section, increased export customers' familiarity with the product/brand may have been a result of modifications to the promotional approach in the past.

Table 4. Multiple Regression Results for Promotion Adaptation with Both Internal and External Environment as a Combined Group of Independent Variables

Independent Variables Internal and External Environment	Dependent Variable Promotion Adaptation *Beta* Coefficient	*t* value
Product/Brand Familiarity	**.203**	**2.912****
Commitment to Venture	**.245**	**3.503****
Technology Intensiveness	**.207**	**2.938****
Product Uniqueness	**.130**	**1.875†**
International Competence	.110	1.571
Experience with Product	.039	.553
R^2	**.152**	
Adjusted R^2	**.138**	
F-Ratio	**10.960*****	

***p<.001; **p<.01; †p<.1

4.3. Determinants of Support to Foreign Distributor/Subsidiary

The variables in both independent models (Table 2) also came out in the overall model (Table 5). However, combining the internal and external variables rendered the overall model an increased capability in explaining the variance in adaptation of support to foreign distributors/subsidiary (from R^2 = 9.4% and 5.2%, Table 2 to R^2 = 13.3%, Table 5). The relevant correlates of support to foreign distributors/subsidiary are product uniqueness, regulatory/non-tariff barriers and cultural acceptability.

Table 5. Multiple Regression Results for Adaptation of Support to Foreign Distributor/Subsidiary with Both Internal and External Environment as a Combined Group of Independent Variables

Independent Variables Internal and External Environment	Dependent Variable Distribution Adaptation *Beta* Coefficient	*t* value
Product Uniqueness	.286	4.142***
Regulatory/Non-Tariff Barriers	-.197	-2.857**
Cultural Acceptability	-.127	-1.852†
Technology Intensiveness	.080	1.127
Commitment to Venture	-.043	-.620
R^2	.133	
Adjusted R^2	.123	
F-Ratio	14.081***	

***p<.001; **p<.01; †p<.1

Adaptation of support to foreign distributors/subsidiaries is more likely when the product is unique, when there are a lot of regulatory/non-tariff barriers in the export market and when the product is not very culturally acceptable.

Product uniqueness positively affects the level of support to foreign distributors/subsidiary (Table 5). Process and design exclusivity, which renders uniqueness to the product, calls for more training, promotional and overall support to foreign distributors/subsidiary. Managers interviewed believe that foreign distributors who are more familiar with the raw materials and processes involved in the manufacture of the products that they sell are more effective because they can better explain the products' features and benefits to their customers. A manager of a firm manufacturing novelty items using abaca fiber took his foreign distributor to an abaca plantation and a fiber processing plant in the Philippines to show him the process involved in the manufacture of their products.

The extent of the export market's regulatory/non-tariff barriers negatively (β = -.197) affects the level of training and overall support provided to the foreign distributor and subsidiary. As this variable is negatively coded, this means that the more tariff and non-tariff barriers there are in the export market, the more support firms provide their foreign distributors/subsidiaries. The training, promotional and overall support become necessary when the firm shifts its strategy emphasis to non-price elements. Such is what exporting firms resort to when confronting minimum import pricing, a non-tariff barrier in the export market. Distributors armed with substantial knowledge about the export products can provide their export customers enough information that could emphasize the products' superior quality.

When the product is culturally specific, support to foreign distributors/ subsidiaries is more likely in order to bring it closer to the customers. Knowledge on the product's use, features and benefits gained by distributors from training support provided by export firms are helpful in creating customer awareness and

familiarity, specifically for products which are not very culturally acceptable or are not commonly used in the export market.

Though its contribution to the model is not significant, the negative relationship of commitment to the export venture with adaptation of distributor support can be explained along the lines of optimization of resources committed to the venture as discussed in the product adaptation section. The *beta* coefficient of technology intensiveness of the industry is as hypothesized but its contribution is not significant.

4.4. Determinants of Price Competitiveness

Only the firm's experience with the product came out as relevant to adaptation of pricing strategy in the independent (internal) model (Table 2). The independent (external) model indicated that the independent variables do not significantly contribute to the changes in the dependent variable. This suggests that the internal environment of the firm is more relevant in predicting price competitiveness than the external environment. However, in the overall model (Table 6), experience with the product and regulatory/non-tariff barriers came out as significant correlates. The negative relationship of experience with the product to price competitiveness suggests that a firm with little experience with a product is more likely to offer a lower price for it, seemingly to establish a broad customer base. The positive relationship of regulatory/non-tariff barriers (negatively coded) to price competitiveness suggests that the fewer barriers there are in the export market, the more price competitive the firms can be.

Table 6. Multiple Regression Results for Price Competitiveness with Both Internal and External Environment as a Combined Group of Independent Variables

Independent Variables Internal and External Environment	Dependent Variable Price Competitiveness *Beta* Coefficient	*t* value
Experience with Product	-.147	-2.015*
Regulatory/Non-Tariff Barriers	.136	1.875†
Technology Intensiveness	-.038	-.516
Commitment to Venture	.064	.868
R^2	.021	
Adjusted R^2	.016	
F-Ratio	4.060*	

*p<.05; †p<.1

Only two of the four hypothesized determinants of price competitiveness emerged as significant (Table 6). The sign of the *beta* coefficient of commitment to export venture is in the right direction, but technology intensiveness of the industry exhibits a negative relationship with price competitiveness (β = -.038). Price as a competitiveness weapon resulting from either technology intensiveness of the industry or higher commitment to the export venture does not appear to be an option for the firms sampled. This may be attributed to the lower product price offerings by export manufacturers in other countries, specifically, China. Most of the managers interviewed admitted that they could not compete with China with respect to price. Relative to China, labor costs in the Philippines are higher. Consequently, firms can only compete by offering better quality products, reflecting a preference for non-price competition. Offering superior quality products creates customer loyalty, decreases customers' sensitivity to price and protects firms from other competitive forces which reduce price-cost margins (Porter, 1980).

Table 7. Summary Assessment of Hypotheses

Proposition/Hypotheses	Results
Proposition: Export strategy is influenced by firm and product characteristics, technology intensiveness of the industry and export market characteristics.	
The degree of product adaptation increases as:	
a. firm's international competence increases	supported, not significant
b. commitment to export venture increases	refuted
c. firm's experience with product decreases	supported, not significant
d. cultural acceptability of product decreases	supported, not significant
e. product uniqueness increases	**supported**
f. technology intensiveness of the industry decreases	supported, not significant
g. export customers' product/brand familiarity decreases	refuted
The degree of promotion adaptation increases when:	
a. firm's international competence increases	supported, not significant
b. commitment to export venture increases	**supported**
c. firm's experience with product increases	supported, not significant
d. product uniqueness increases	**supported**
e. export customers' product/brand familiarity decreases	refuted
f. technology intensiveness of the industry decreases	refuted
Support to foreign distributor/subsidiary increases when:	
a. commitment to export venture increases	supported, not significant
b. product uniqueness increases	**supported**
c. cultural acceptability of product increases	**supported**
d. technology intensiveness of the industry increases	supported, not significant
e. regulatory/non-tariff barriers increase	**supported**
Price competitiveness increases when:	
a. commitment to export venture increases	supported, not significant
b. experience with product decreases	**supported**
c. technology intensiveness of the industry increases	not supported, not significant
d. regulatory/non-tariff barriers decrease	**supported**

V. Conclusions

The research proposition posited a link between the firm's internal and external environment and export marketing strategy. The overall model, which combines the external and internal environmental variables, has a better capability in predicting variations in the adaptation of export marketing strategy compared to the two models which considered the internal and external environment separately.

The significance of product uniqueness, export customers' product/brand familiarity, commitment to the export venture, extent of regulatory/non-tariff barriers, technology intensiveness of the industry, firm's experience with the product and cultural acceptability of the product should be taken into consideration in the formulation of export marketing programs (Table 7). Nevertheless, the role of the other environmental factors which support the findings in the literature but which did not show statistical significance should not be ignored.

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Uncertainty of Technology Usage and the Firm's Strategy Behavior

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ABSTRACT

This study is to analyze the relationship between uncertainty avoidance behavior patterns of R & D which have occurred to address the uncertainty of technological usage, and uncertainty avoidance behavior patterns of business which have occurred to address business values. To clarify that with the above relevant relationship, the determining firm's strategic behavior will be the purpose of this study.

I. Business Influence from Uncertainty of Technological Usage

Product and business lifecycle is becoming shorter, as a result of circumstances of market diversification by economic development of emerging markets and technical development of internet diffusion and digitization. Thus, firms will focus on choice and focus[1] because of the vicious circle resulting from the recession[2] and changes in production activities[3]. However, this effect may rebound on a firm's business or technologies, which could be disused or be sold after the choice and focus has changed. These issues are considered to be derived from uncertainty involved in the choices of firm attributed to technological usage. The case is that the firms are investing a huge amount of costs in R&D and the timing of harvest time, but considering the latest business environment, developed technology could be undervalued, or more powerful and useful technology has been developed, the originally developed technology could be considered for discard or sale, or forced a reduction in R & D investment, even though the original technology could create a greater value later. The uncertainty of this technological usage in the firm could be considered as a determination of the cause of the short life cycle of business and technology.

1 Firms review the structure and profitability by concentrating on business during recession.(Nikei Business, 2010a:p.53; Nikei Electronics, 2010:p.116).

2 Negative cycle caused by the withdrawal of business by companies(Kathryn and Michael, 2009:p.113).

3 See Nikei Business (2010c).

II. Possibility of Uncertainty Avoidance and Activities of Avoidance

By the way, regarding uncertainty, Hugh *et al* (1997) argues that events that occur in the future are not alternatives, predictable or unpredictable and that the following is possible. There is a strategic activity for each of separate events that may occur in the future, including such possible futures as: A Clear-Enough Future、Alternate Future、A Range of Futures、and True Ambiguity. Strategic actions to avoid uncertainty are "Shape the future", "Adapt to the future" or "Reserve the right to play" (Hugh *et al*, 1997: pp.68-71). Hugh *et al* (1997) separate three patterns of uncertainty avoidance behavior; the first uncertainty avoidance behavior of technological usage is "Shape the future" (shape new markets and technology). It is a behavior to take control of a market or technology by shaping a new market or technology. The second is "Adapt the future", adapting to a technological change or a market change quickly. It means "adapt to the market or technology, or the technology and market Shaped by the other firm". The third is 'Reserve the right to play", which means adapting and waiting for the right timing for investing in the current new market and new technological areas, and once the uncertain issues are well cleared, the time will arrive that eliminates all uncertainty at once. This behavior is the "action to actively participate after a technology is evaluated by the market". However, "Reserve the right to play" is not correct on the uncertainty avoidance behavior side of technological usage; that is why it is an action after evaluation. Under with several options under condition, this harmonizing behavior could be also considered as one of adapting behavior. Therefore, uncertainty avoidance behaviors are separated into "Shape the future" and "Adapt to the future".

III. Action and Coping of Strategies of Business and R & D

There are close relationships between business strategy and R&D strategy (Ito, 2000), and those mutually affect each other between business strategy behavior and R&D strategy behavior. This R&D behavior means R&D activities to determine the needs for development of technology and technological usage. Therefore、the issue is a relationship of uncertainty avoidance behavior between R & D and business. Uncertainty in R & D activities will occur in target technologies and technological usage. If alternative technologies are developed with their technology by other companies, it will not be technologically superior. If there is low business value of the technological usage thought is to be applied, technology will not be needed. To deal with these uncertainties and to set a wide range of technological usage in development or technology applied, it is required that the business enable the transformation of technology usage leading to business value in case of the advent of alternative technologies.

IV. Cases of Technology Choice Behaviors for Uncertainty Avoidance on a Firm's R & D

In this part, I would like to analyze the case of an action to deal with such uncertainty by using a HDD (Hard Disk Drive) head development case and a DRAM (Dynamic Random Access Memory) development case.

4.1. Technology Choice Behavior in IBM and Fujitsu on HDD

First of all, development in the case of HDD head during the transition period for the technology; considered are the contrasting actions of IBM and Fujitsu. IBM has been ahead in technology, including the HDD head technology migration from the Ferrite head during the transition to the thin-film head (Kusunoki & Chesbrough, 2001) and the thin-film head

during the transition to the MR head (Kusunoki & Chesbrough, 2001). HDD's main technology was a shift in the 1960s and 1970s, during the transition from ferrite heads to thin-film heads. Until then, the HDD head used a ferrite head. However, in the 1970s it was found that performance approached the physical limit of the ferrite head. Then IBM, the Institute of Yorktown, started the development of the next generation thin-film HDD, and development of a prototype of the head was successfully completed in 1971 in advance of the competitors. To compete with IBM, a number of other companies started development of a thin-film head, but other research failed in the development of thin-film head technology.

The thin-film head had dramatically improved the performance of the HDD, but to take full advantage of its features, it was critical to make a close coordination with the various components of non-head (Kusunoki & Chesbrough, 2001).

Later, during the transition from the thin-film head to the MR head, when the thin-film head technology limitations were recognized, IBM went through the same transition as it had when studying the thin-film head from the Ferrite head to develop MR head technology. IBM's competitors had started research and development of the MR Head after IBM Institute had finished development. However, the same as thin film head was developed, in order to fully demonstrate the potential of MR Head, the associated elements of technology needed to solve the problem of interaction. IBM had actively coordinated this with elements of technology, so it was possible to use the head in the previous generation of technology as opposed to other companies (Kusunoki & Chesbrough, 2001). IBM was leading in head technology for two migrations of HDD technology. In contrast, Fujitsu attempted a different development activity. Fujitsu's MR Head was simultaneously pursuing two options (thin-film head with further sophistication and vertical head) that exist in addition to the development of alternative technologies.

In MR Head development Fujitsu was a follower of IBM. Fujitsu could create in MR HDD technology and track the migration because Fujitsu had also been promoting the development of these two options (Kusunoki & Chesbrough, 2001). It can be understood that the technology was developed in parallel to possible alternative candidates, in order to reduce uncertainty in the development of Fujitsu's technical head. The purpose is to understand the degree of attractiveness considered in the choice of whether to increase the options in adapting the technology to possible uses.

4.2. Technology Choice Behavior in Five Japanese Firms Regarding DRAM

For the next case, I would like to explain the DRAM development case, which was the migration period of 64K·DRAM to 1M·DRAM technology. Japanese companies' share occupied 70% of 64K·DRAM in the world market. DRAM had been used in many digital information storage devices and other PCs. Consider this selection behavior of DRAM technology development companies in technology development (Yoneyama, 1998). Prior to the time of DRAM competition, the competitors had been sharing the developmental direction. Following the completion of DRAM, the next generation was developed every three or four years, and 10 million pieces were sold; it became necessary to develop faster than their competitors.

Then, 64K DRAM technology was necessary to be used to develop new 1M DRAM technologies; that technology has been used differently in this study to consider the behavior of 5 Japanese firms (Toshiba, NEC, Mitsubishi Electric, Hitachi, and Fujitsu) in technology selection. Toshiba is actively developing advancements parallel with planar and trench technology for old technology and new technology. Toshiba will develop information sharing among individual research projects by creating internal competition in order to increase the efficiency of development. On the other hand, NEC is also focusing on main technology enhancements and the limitations of existing technologies in planar technology transfer;

the development of new technology, trench technology, and the advanced research and development are two of these among active developers in the wake of the internal competition. Hitachi has also been developing intensively based upon the initial 4M advanced trench technology choices in new technology. Hitachi also changed new technologies (C-MOS); with Element technology, Mitsubishi Electric is already more focused on aspects of the production process. Technology from 1M DRAM trench technology was applied to the former. Fujitsu, uses new technology (stack technology) with main technology and N-MOS Element technology. Fujitsu's development is also considering actions for future technological developments as well as Hitachi. It is summarized in this table.

V. Firm's Technology Choice Behavior for Uncertainty Avoidance

Table – Patterns of Technology Development for the Choice of each Firm's Technology

firm's name	technology choice behavior	Patterns of technology development	Initial choice of development technology
Fujitsu (HDD)	Main technology—New technology (MR head、Vertical head)、Old technology (thin-film head)	Earlier parallel development After selection of technology	Both technology
IBM (HDD ヘッド)	New technology—MR Head、thin-film head	Earlier selection of technology After Intensive development	New technology
Hitachi (DRAM)	Main technology—New technology (trench) Element technology—C-MOS	Earlier selection of technology After Intensive development	New technology
Fujitsu (DRAM)	Main technology—New technology (stack) Element technology—Old technology (N-MOS)	Earlier selection of technology After Intensive development	New technology
Mitsubishi Electric (DRAM)	Element technology—Old technology (Planar) Element technology—New technology (C-MOS)	Earlier selection of technology After Intensive development	Old technology
Toshiba (DRAM)	Main technology—New technology and Old technology Element technology—New technology and Old technology	Earlier parallel development After selection of technology	Both technology
NEC (DRAM)	Main technology—New technology (trench Head) Element technology—Develop New technology, after use old technology	Earlier parallel development After selection of technology	Both technology

Shown in the table, a company is taking an action to develop technology, develop multiple technologies in parallel first, choose a technology, or choose a technology first then performing technology-intensive development later. IBM, Hitachi, Fujitsu, and Mitsubishi Electric are focused on allocating R&D resources by selecting a technology early. Fujitsu (HDD head), Toshiba, and NEC reserve the choice of technology by parallel development of technologies, on which Hugh, etc. (2000) stated "Shape" and "Adaptation" is applied to the action by concentrating resources on research and development. "Shape" an action to and others not leading may follow suit so as to increase the choice of technology action "adapt". For such actions, Fujisue (2005) said firms that stated the option was to bring resources to get the most effective competitive advantage, even in technological development, because it requires the allocation of limited resources.

One consideration from this case is that a firm may have selected determining the actual choice of technology development and developing multiple technologies concurrently.

That is, given the uncertainty avoidance patterns, it may be trying to reduce the uncertainty in technology

development by allocating resources for the development of multiple technologies to be developed and a limited focus on one technology resource. In this regard, Shibata (2008) has said parallel development occurs when a factor is capable of holding multiple choices from that period that can be presumed to postpone a decision until uncertainty is sufficiently reduced.

VI. Uncertainty Avoidance Behavior Patterns in R&D Activities

The conforming "Shaping" and "Adapting" behavior to the former indicated uncertainty avoidance behavior, as seen in Table 1. Concentrating on developing a certain technology but at the same time further considering use of a technology (technology-aggregation and usage-diffusion) which could lead to a new market from the new technology is "Shape the future" behavior, or behavior 2. Several technologies in development in parallel (technology-diffusion and usage-aggregation), which could be adapted to newly shaped technology and newly created technological usage by a leader firm, is "Adapt the future" behavior . By concentrating on a specific technical area to expand the use of a technology is the action to concentrate an investment resource, then the technology may to lead a market (for example, IBM[4], Shape[5], Konica Minolta Holdings[6]). Through parallel development for several technologies which are regarded to have certain values, this style can catch up quickly with the competitors that had the lead in development completion (for example, Panasonic, Fujitsu[7]).These development mechanisms and matching screening actions to the company's strategic management and R&D management should help avoid uncertainty behavior as determined (Ito, 2000)[8].

VII. Pattern of Avoidance Action in Business Uncertainty Activity

Companies' business behavior and decision making also is also affected by market needs which do not relate to technology, or from social environment issues. To avoid the uncertainty of business risks, a company aims for the diversification of the business. Through diversification of the business in the market, there could be relief from a market's variation. Therefore, pluralization behavior is the avoidance of uncertainty behavior. This behavior could be considered as aggregation (it is a choice and focus to truncate a non-profitable business) or diffusion (enter into market after finding a profitable market). A firm's strategic business decision making may have a semi-isolated factor which does not harmonize with uncertainty avoidance behavior on R&D.

VIII. Interaction Between R&D Behavior and Business Behavior

A firm makes a choice of strategic behavior for technology-aggregation (technology applications applied to multi-faceted technology-intensive development),

[4] IBM is Considered the leading technical during the thin-film head transition from the Ferrite Head, and the magneto resistive head transition from the thin-film head（Kusunoki and Henry, 2001:p.275-276）.

5 Sharp is a leading company in LCD, and Intensive development of a typical technology. Sharp has preceded development of LCD technology and has made use (LCD calculator to color LCDs) of LCD technology（Nikei Electronics, 2009:pp.116-121）.

[6] Konica Minolta Holdings, despite the withdrawal in 2006, has won 30% of its share of two products by advantage of expertise in the photographic film business（Nikei Business, 2010b:pp.47-49.）

[7] Fujitsu is considered adapting during the MR head transition from the thin-film head. Fujitsu had been developing in parallel to the Perpendicular head and the highly efficient thin-film head during the MR head transition from the thin-film head（Kusunoki and Henry, 2001:p.277-278）.

[8] Ito（2000：p.53） argue production plan is different each other business strategy and R&D strategy, and it will be Discarded product plan on R&D strategy plan isn't shared. Risk avoidance of this paper is indeed a problem of technology choice in uncertainty of technological usage. And this action also influences management strategies.

technology-diffusion (parallel development of multiple technologies in one or more technical uses), business-aggregation (choice and focus) or business-diffusion (new entry). If a firm does not maintain integrity with these choices, uncertainty avoidance is risky. If a firm chooses technology-aggregation and business-aggregation, it will suppress the formation of new markets through new technology by being constrained by a range of applications of the technology-intensive firm. On the other hand, if a firm selects technology-diffusion and business-diffusion, it will have not to get technical support on a number of new businesses. Therefore、if the relationship is non-conforming to uncertainty avoidance behavior due to R & D and uncertainty avoidance behavior in business、uncertainty avoidance will end in failure for the firm. It will be neccesary to understand the business strategy by understanding how the process will fit between the two uncertainty avoidance behaviors (or be separate).

IX. Conclusion

In this study, patterns of avoidance behavior based on uncertainty of technological usage and uncertainty related to market unclearness have been screened. In the case used in the analysis, competitive and technological developments have focused on the migration in the early electronics technology area, also considered a biased case. To achieve the purposes of this study, the industry must take a sharp turn throught the company's performance in the choice of technology. The industry had to have a large contribution to the work by choice or action .Under strategic management, both in technology and the market avoidance of uncertainty must be eliminated at the same time. However, the influence and the interaction of the technology and the market avoidance of uncertainty were not analyzed in detail. This will be studied further with an additional actual study later on.

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Tenure Security and Well-being of Indigenous Communities in the Uplands

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ABSTRACT

Indigenous peoples belong to the marginalized sector of society. They are characterized by a host of attributes, foremost of which are limited income opportunities and lack of access to basic services. These concerns, in addition, are particularly important for the Indigenous Peoples because they occupy ancestral lands for which they claim ownership. For the Indigenous Peoples, land, culture and life are intertwined and inseparable. Thus, the different and often times conflicting perspectives and values attached to the same parcel of land give rise to problems and abuses.

I. Introduction

The Philippine uplands and natural resources sectors are in a quagmire of declining real per capita incomes, rising man-land ratios alongside unequal access to natural resources and rapid environmental degradation. Consequently, increasing productivity, poverty alleviation, promotion of social justice have become important issues of public policy. The situation becomes more intense for the Indigenous Peoples (IP) who possess, occupy and use ancestral lands for which they claim ownership. In the Philippines, these lands are scattered all over the archipelago, occupied by about 110 ethnolinguistic groups. The lands are estimated to cover about two million hectares, about seven percent of the country's land area. Indigenous Peoples refer to homogeneous societies identified by self-ascription and ascription by others, who have lived as a community on communally bounded and defined territories and share common languages, customs, traditions and other cultural traits and who have through resistance to political, social and cultural inroads of colonization become historically differentiated from the rest of the Filipinos. The IPs are generally regarded as belonging to the marginalized sector of society and are characterized by low functional literacy, low employment and high underemployment rates, a lack of access to basic services, a narrow asset base and limited income opportunities.

II. The Indigenous Peoples

There are at least six major groups of indigenous peoples in the Philippines. These are the Mindanao Lumads, the Cordillera Peoples, the Caraballo Tribes, the Agtas and Aetas, the Mangyans of Mindoro and the Palawan Hilltribes. They number about 3.5 million and live, for the most part, in the provinces of Davao, Bukidnon, Agusan, Surigao, Zamboanga, the Cordillera mountain range, Nueva Vizcaya, Nueva Ecija, Qurino and Mindoro.

Land, culture and life are intertwined and inseparable for the Indigenous People. Thus, the different and oftentimes conflicting perspectives and values attached to the same parcel of land give rise to problems and abuses.

III. Indigenous Peoples and Land Rights

To ensure the well-being of the Indigenous Peoples, provisions on their rights to their ancestral lands may be found in the 1987 Philippine Constitution. In particular, the Articles on the Declaration of Principles and State Policies, National Economy, Social Justice and Human Rights and on the Arts and Culture stipulate in definite terms, the rights of Indigenous Peoples. These rights are further maintained in the enabling statutes, notably the National Integrated Protection Areas System Act (NIPAS), the Comprehensive Agrarian Reform Program (CARP) and the Indigenous Peoples' Rights Act (IPRA).

The rights of the IPs to their ancestral lands emanate from the 'prior rights doctrine' found in a 1906 case Cariño vs. Insular Government penned by prominent American jurist Oliver Wendell Holmes Jr. The case involved a claim of a native Ibaloi to ownership preceding colonization. Justice Holmes wrote, "It is true that Spain, in its earlier decrees, embodied the universal feudal theory that all lands were held from the Crown, and perhaps the general attitude of conquering nations toward people not recognized as entitled to the treatment accorded to those in the same zone of civilization with themselves. It is true, also, that in legal theory, sovereignty is absolute, and that, as against foreign nations, the United States may assert, as Spain asserted, absolute power. But it does not follow that, as against the inhabitants of the Philippines, the United States asserts that Spain had such power. When theory is left on one side, sovereignty is a question of strength, and may vary in degree. How far a new sovereign shall insist upon the theoretical relation of the subjects to the head in the past, and how far it shall recognize actual facts, are matters for it to decide." Justice Holmes, thus, ruled in favor of Cariño and ordered the registration of the 148 hectares in Baguio Municipality in his name that is tantamount to the recognition that Cariño had "native title" to the land.

However, the same Constitution, as well as the 1935 and 1973 Constitutions, also stipulated that all lands of the public domain and other natural resources are owned by the State. In addition, all other natural resources, except agricultural lands, are non-alienable; their exploration, development and utilization are vested in the State. This concept of State ownership originates from the principle of 'jus regalia', also known as the Regalian Doctrine. In simple terms, this means that the Spanish king claimed ownership of everything of value in the Indies or colonies thereby stripping natives of their ancestral rights to land. Philippine jurisprudence has invariably followed the Regalian Doctrine.

In order to highlight the contentious issue of the Regalian Doctrine versus the prior rights doctrine, the Philippine Supreme Court dealt with the issue head on whether "ancestral domain" should be recognized as a legal precept in Philippine jurisprudence. In the Isagani Cruz and Cesar Europa, petitioners, vs. Secretary of Environment and Natural Resources, Secretary of Budget and Management and Chairman and Commissioners of the National Commission on Indigenous Peoples, respondents, the Supreme Court ultimately upheld the ancestral domain as a working legal category through a 7-7 vote.

These conflicting positions regarding ownership claims have led to the encroachment of logging and mining concessions, public development projects and the continuous migration of farmers and other settlers from the rural and urban areas seeking relief from landlessness and poverty. Subsequently, the IPs, time and again, have been displaced or disenfranchised and have called out for security of tenure including full ownership to their ancestral lands.

The authority to undertake certain actions related to specific domains is termed in the literature as property right (Hardin, 1968 and Cuevas, 1994). Given this definition, there are two elements crucial in understanding property right systems: the authority scheme (decision-making arrangements) and specific domain (Cuevas, 1994). For the Indigenous Peoples, the specific domain on which they have property rights is their declared Ancestral Domain. Moreover, a complete specification of these rights reduces uncertainty and promotes efficient use of resources.

Analyzing the existing rights of Indigenous Peoples requires an understanding of the different bundle of rights. Access and withdrawal rights (which Cuevas, 1994, combined under use rights) are the most relevant property rights that concern natural resources. Access is defined as the right to enter a defined physical property and withdrawal as the right to obtain the product of the resource (Schlager and Ostrom, 1992). Management, exclusion and alienation are three other property rights. The first refers to the right to regulate internal use patterns and transform the resource by improvements, and gives authority to its holders to devise operational level withdrawal rights governing the use of the resource. Exclusion is the right to determine who will have access rights and how the right might be transferred. Alienation is the right to sell or lease either or both of the right to manage and the right to exclude (Schlager and Ostrom, 1992).

Property rights may be transferable or not. When individual rights are saleable for goods or for money or subject to bestowal and removal for services rendered, the property rights are transferable. A non-transferable right means that the rights have been removed from individual control. In this case, government or a community of users has the right.

The sources of these rights are varied. A government, through its officials, may explicitly grant the rights. In this case, these rights are de jure rights since they are given in lawful recognition by formal and legal instrumentalities. Property rights may also originate among the resource owners. Sometimes, resource owners cooperate to define and enforce property rights among themselves. In this case, the rights are de facto rights. By enforcing the rights among themselves, de facto rights holders act as if they have de jure rights. De facto rights may eventually be given recognition in court, but until they are recognized, they are less secure than de jure rights.

IV. Government Intervention in Ancestral Lands and Peoples Organizations

A constitutional provision states that, except for agricultural lands, no land of the public domain shall be classified as alienable and disposable. This provision has ramifications in legislation and bureaucratic interventions since it affects the degree of tenure security of the IPs who are sometimes viewed as squatters on their own ancestral lands. The forest or timber category is the most important among the four-use categories, as most ancestral lands have a slope of 18% or higher which by law is defined as forestral under the Revised Forest Code. Classified mineral lands and national parks also interface with ancestral lands. The Mining Act of 1995 and the NIPAS are relevant pieces of legislation that affect the IPs. The IPs also perform agricultural activities even in areas classified as forestlands and in this case, these areas may fall under the scope of the Comprehensive Agrarian Reform Law.

The Department of Environment and Natural Resources (DENR) has exclusive jurisdiction over the management, conservation, development and proper use of the environment, natural resources and the disposition of all lands of the public domain. NIPAS reinforces this mandate. The Ancestral Domain/Lands Program, which is part of the forestry program of the Department, puts emphasis on the plight of the IPs. An administrative order prescribes the rules for the identification, delineation and recognition of ancestral land and domain claims. The program provides tenure security to IPs and ensures sustainable development through traditional management practices while protecting the constitutionally recognized rights.

The aim of the Comprehensive Agrarian Reform Program (CARP) on tenure improvement encompasses all agricultural lands, including ancestral lands. Under an agreement with the DENR, all alienable and disposable lands of the public domain were to be transferred to DAR. Members of indigenous communities who have in their possession the Certificate of Ancestral Domain Claims are to be awarded CARP Beneficiary Certificates; this will entitle them to qualify for CARP support services. The agricultural sections of the IP areas will then be developed into Special Tribal Agrarian Reform Communities just like the Agrarian Reform Communities that were formed in the private agricultural lands.

The enactment of Republic Act 8371, otherwise known as the Indigenous People Rights Act of 1997 provides the basic framework for the recognition, protection and promotion of the rights of the Indigenous Communities primarily through the creation of the National Commission on Indigenous Peoples (NCIP) which is the government instrumentality responsible for the formulation and implementation of policies, plans and programs to effect the spirit of the law. The salient provision of the statute, besides the enumeration of IP rights and funding, is the requirement of free and prior informed consent from the all the members of the indigenous community on all activities that will be undertaken in the ancestral domain. This would ensure the empowerment of the indigenous peoples to chart their future consistent with their traditions, customs, and way of life.

Non-government organizations and peoples' organizations also are important agents in the development and welfare of IPs. The activities of these organizations are on two levels: policy and community levels. A couple of these organizations were involved in the legislative exercises, while at the community level, these NGOs work to enhance the well-being of the IPs.

V. Tenure and Welfare Concerns in Ancestral Lands

In many cases, mineral resources are found in the ancestral lands. Thus, mining companies as well as logging concerns are found in these areas. Isolated cases of land grabbing have also been reported. Another form of encroachment comes from migrant landless people from the lowlands. Through time, these migrants acquired land from the IPs who either voluntarily sold the land or were forced to sell the land due to reasons such as credit. Most IPs do not have sufficient income, forcing them to resort to borrowing. The borrowed funds are used for educational purposes, dowries, and small appliances. In many cases, the land is mortgaged, and because it has not been the custom for most IPs to save nor invest, they are unable to redeem the mortgaged properties.

VI. Enhancing the Welfare and Tenure of IPs

There is an urgent need to help the IPs increase their income. Animal power, rough farm to market roads, basic irrigation (via water impounding tanks), and basic skills training can be provided to help the IPs. Likewise, developing marketable skills among the IPs can help

them find off-farm sources of employment and trade. Community organizing activities can be focused on creating greater awareness, understanding and appreciation of their rights. The numerous government laws and ruling which have an impact on their welfare should be made clear to the IPs.

Ancestral domain lands granted to IPs should be comprehensively mapped, and the map should then be used in the design and development of the Ancestral Domain Sustainable Development and Protection Plan (ADSDPP), which would mean zoning the domain into various uses. The plan will then be a means through which the IPs can realize their social, economic and cultural welfare. The plan is also an initial step to empower and provide direction to the IPs and the communities regarding the use and management of their land and natural resources for livelihood purposes in line with environmental and conservation objectives.

Finally, there should be effort to educate and instill knowledge among the non-IPs regarding the indigenous beliefs, practices, needs, customs and mores of the indigenous peoples. Policy makers need to approach the issue with more sensitivity to ensure a more participatory program implementation. Likewise, to preserve their cultural integrity, documenting and recording the IPs traditional knowledge systems and preferences and indigenous ways of living are needed.

VII. Study Area and Objectives

The study area covers six provinces in Northern Mindanao and the CARAGA regions. These provinces were recipients of a development project whose goal in general is to alleviate the poverty situation of more than 50,000 households located in IP and non-IP communities. Targeted beneficiaries are Agrarian Reform Beneficiaries, upland farmers, fisher folk, IPs and women. Major interventions that were implemented were: community institutions and participatory development, community investments, natural resource management, support services and studies and support to indigenous peoples. The latter is the intervention that directly affects the IP community in terms of the provision of tenure security through the Certificate of Ancestral Domain Title (CADT). However, it is maintained that tenure security by itself is not a sufficient condition to improve the welfare of the Indigenous Communities.

In support of the general objective, the specific objectives include: determine the immediate impact of the interventions among IP and non-IP areas in terms of poverty incidence reduction, a reduction in child malnutrition, an increase in school attendance, improved acquisition of household assets, sustained food production, improvement in the management of natural resources, expansion of livelihood opportunities, improved participation of women and security of land tenure, an explanation of the differences in scale and/or outcomes between IP and non-IP groups and discuss how the outcomes and immediate impacts are influenced by factors such as socio-economic-political conditions, etc.

A total of 1, 125 households took part in the survey. This is broken down into 900 project recipient households of which 225 were IPs and 675 non-IPs. The additional 225 were control households which were non-project beneficiaries. The households were randomly distributed to the sample barangays in groups of 30 for the IP and non-IP groups.

The IP groups represented are: Manobo, Higaonon/Banwaon, and Mamanwa.

VIII. Profile of Household Heads

The average age of the household heads in the non-beneficiary group was 46 years, 50 years for the non-IP group and 44 years for the IP group. In the non-beneficiary group, the ratio of male-headed households to female-headed households is 93:7. In the IP area, the domination of male-headed households is even higher at 95%. In the non-IP area, the proportion of male-

headed households to female- headed households is 87:13. In all the three areas, the proportion of married household heads is 8:10. Live-in arrangements or couples living together without the benefit of marriage ceremonies are more pronounced in the IP areas.

In terms of educational attainment, in the non-IP area, 53% are elementary undergraduates while a third (32%) are high school graduates. Only 2.2% finished college. The pattern is nearly the same in the non-project beneficiary areas, with a slightly higher percentage (57%) for those who had elementary education. In the IP areas, seven out of 10 had a few years of elementary education and 16.2% attended high school. Some 9.8 % of household heads had no schooling at all. By and large, household heads in the IP areas had the least amount of years in school.

The religious affiliation of household heads in the non-IP and control areas is similar; three out of four are Roman Catholics. In the IP areas, 54% are Catholics, while four out of 10 belong to the Protestant sect.

Among those who have work, 42% in the non-project beneficiary area regard themselves as farmers, while in the non-IP areas, farmers represent 44% of the sample. Another common occupation is the use of labor in exchange for wages (hired labor). Twenty one per cent in the non-project beneficiary area claim to be laborers as opposed to 15% in the non-IP areas. In the IP areas, two out of three household heads are farmers and 15% are laborers. Those into agri-related occupations account for 3%, while very few are professionals. In general, most of the households live off the fruits of the land and/or their labor.

Table 1. Occupation of Household Heads

Occupation	Non-IP (%)	IP (%)	Non-Project Beneficiary (%)
Farmer	44.1	66.7	42.0
Other agri-related job	7.0	3.0	3.0
Sales worker	1.9	0	2.0
Service worker	7.1	1.3	6.0
Laborers and related workers	15.5	15.0	21.5
Overseas workers	0	.4	0
Professionals	.4	.4	0
Others	23.9	13.2	25.5
Total	100.0	100.0	100.0

IX. Profile of the Children

The mean age of the children in the non-IP and non-project beneficiary areas is the same at 13 years. However, a greater proportion of the children are below 15 years in the non-project beneficiary areas than in the non-IP areas. About 25% of the children in the non-IP areas and about 21% in the non-project beneficiary areas are in the 15-20 age range and live with their parents. In the IP areas, the mean age of the children is 12 years, with two-thirds not yet legally part of the labor force. There is a greater proportion of male children than female children in both the non-IP and non-project beneficiary groups. In the IP areas, a similar pattern is observed. Given the juvenile status of the children, most of them are single.

In terms of educational attainment of the children, the non-IP children are relatively better educated than those in the non-project beneficiary areas. In the IP areas, more than 20% had no schooling. Nearly half (46%) had a few years of elementary education but dropped out before graduation. Another 20% completed elementary education but did not finish high school.

Only 4% proceeded to the university, but only one percent graduated.

Roman Catholic is the predominant religion in the control and non-IP areas, but in the IP areas, a considerable number are Protestants.

X. Household Characteristics

For all the household groups, the dwellings are largely owned or being amortized. Likewise, in terms of tenure status of the lot, half are owned or being amortized and half are occupied rent free with the consent of the owner. The houses are mostly of the single detached type; a few houses are of the duplex type. In general, most of the houses were built in the last ten years; 70% in the IP areas were built in the last decade. The houses are small, with a modal floor area of 10-49 square meters. Galvanized iron made up half of the roofing material, but there is also a preponderance of native roofing materials like nipa, anahaw and cogon. Across the household groups, a majority indicated that their houses need minor repairs.

XI. Household Assets

In general, the non-project beneficiary areas have a higher percentage of ownership of household assets like radio/cassette, television and disk players. For the IP areas, the percentage of ownership of household assets is low with the radio/cassette and television being the most common.

XII. Farm Characteristics and Crop Production

On average, nine out of 10 of the land parcels being cultivated by the respondents are located within their barangay; more than half are located in rain fed upland areas. In the IP areas, two out of three parcels are in such areas where the slopes are more rolling or undulating rather than flat. Thus, irrigation systems are largely open canal types.

In the non-IP areas, land is planted with three major crops: hybrid rice, white corn and coconut and to some extent, upland rice. In the non-project beneficiary households, high yield rice varieties, white corn and coconut are the dominant crops while in the IP areas, white corn, coconut and various root crops dominate the landscape with rice as a minor crop. The average size of the land is small, averaging less than a hectare.

Table 2. Distribution of Crops Planted

Major Crop	Non-IP (%)	IP (%)	Non-Project Beneficiary (%)
Rice			
Hybrid Rice	15.3	2.0	1.7
HYV Rice	8.3	7.8	19.1
Upland Rice	10.2	5.1	4.3
Corn			
Hybrid/BT Corn	0.9	0.7	-
Yellow Corn	4.0	7.5	4.3
White Corn	16.6	17.1	24.3
Coconut	15.3	16.4	22.6
Banana	7.9	12.6	7.0
Other Crops	21.5	30.7	16.5

In terms of hybrid rice yields, non-IP households have higher yields than the non-project beneficiary areas. However, the opposite is true for high yielding rice varieties and traditional upland rice varieties. Non-project beneficiary areas also fared better when it comes to corn and coconut yields. The average yields for IP areas are lower than non-IP areas except for upland rice, white corn, coconut and banana.

Table 3. Production and Yield by Crop

	Non-IP		IP	
Crop	Total Production (mt)	Yield (mt/ha)	Total Production (mt)	Yield (mt/ha)
Hybrid Rice	3,761.27	3.25	2,307.00	2.56
HYV Rice	4,491.36	2.78	4,087.83	1.86
Upland Rice	3,839.88	2.68	3,462.50	3.89
Coconut	1,627.63	1.25	1,739.62	1.63
Banana	1,354.09	2.53	4,599.31	4.49
Yellow corn	1,772.63	1.26	2,174.77	1.22
White corn	1,289.03	1.15	1,784.49	1.93

XIII. Household Income

The households generate income from on-farm, non-farm and off-farm employment. IP households earn some PhP8,335 more than non-IP households from farming, but non-IP households earned more than twice than that of IP households from non-farm activities. Off-farm employment cushioned the earnings of the households, contributing as much as 20% of their total annual income. Given an average household size of 5, the annual per capita income of a non-IP household is PhP 12,137; the IP household's per capita income is P11,138.

Table 4. Average Annual Household Income by Source, in PhP

Type of Income	Non-IP	IP
On-Farm	12, 015	20,350
Non-Farm	38,021	18,952
Off-Farm	10,649	16,389
Total	60,685	55,691

The official rural poverty threshold for Northern Mindanao in 2007 was PhP13,832. Comparing this with the figures in Table 4 would tell us that the poverty incidence remains high.

XIV. Incidence of Water-borne Diseases

A higher incidence of water-borne diseases in the IP areas was noted, with some 35% of the household being affected by diarrhea or amoebiasis. Three of four cases involved children. About 15% of the respondents in the non-IP and nareas on-project areas were also affected by water-borne diseases. The children were more predisposed to get sick from contaminated water.

XV. Natural Resources Management

In the non-IP areas, there was a greater percentage of households who adopted some form of natural resource management strategy than in the non-project beneficiary areas, ostensibly brought about by the

interventions on natural resource management. However, there were still 74% who claimed to never employ any strategy despite the project intervention. In the IP areas, about 33% of the households adopted a resource management strategy.

Table 5. Natural Resource Management Adopted, by Strategy

	Non-IP (%)	IP(%)
Use of organic fertilizer	67.2	30.1
Intercropping	3.1	6.8
Crop rotation	7.6	5.5
Multiple cropping	19.8	57.5
Cover cropping	.8	0
Planting of nitrogen fixers	.8	0
Others	.8	0

Some 52% of the households were aware of the project interventions. However, four out of the 10 households were not aware of the project. Among those who knew of the project, 66% equate the project in terms of providing projects/assistance to the community, like financial assistance, road rehabilitation, land distribution and improving the economic status of the households. Participation in the project activities involved attending seminars, meetings and livelihood trainings.

In general, the male spouse decides on matters pertaining to the farm. There is also a noticeable fraction of households where conjugal decisions are made. The conjugal decisions are more evident in the decisions involving production and credit markets. In the IP areas, the role of the male spouse as the primary decision maker is more pronounced, with at least 40% of them making decisions on farm practices, e.g., what to plant, inputs to utilize, hiring of labor, when to harvest, marketing of produce, credit availment, and use of farm machinery. In matters involving the household, the wife is the main decision maker; the husband largely yields to his partner. But when the decision involves the budget and the education of the children, the male spouse becomes part of the decision-making process.

The most common types of organizations are peoples' organizations and farmers' organizations. Some men were also members of a women's organization. Membership in cooperatives is also evident, particularly among the men. In the IP areas, membership in cultural minority groups is expected.

Only 6% of the respondents noted that there were changes in their farming practices, i.e., in the crops planted with the advent of the project. The percentage in the change in crops planted is higher in the IP areas than in the non-IP areas. Changes were also noted in the cropping patterns. As far as yields are concerned, 14% reported higher yields with the introduction of the project, with IP households posting slightly higher percentages than non-IP households. One in five households reported an increase in their household income; this was slightly higher for IP households.

XVI. Summary of Findings

Children in the non-IP households have higher educational attainment and spend more years in school. There is also a higher adoption of natural resource management strategies, particularly in the use of organic fertilizer. Non-IP households also see a lower incidence of water-borne diseases. Non-IP households also have a higher value of household assets. Higher yields for hybrid rice among non-IP farm households were also reported. Among the IP households, a slight

change in the crops planted and cropping systems after the introduction of the project was noted. Farm yields increased by about 14%; 25% of the household areas in the IP areas reported an increase in income. In the main area, yields are lower in the IP areas while they have lower per capita household incomes relative to non-IP areas. While the project has provided tenure security through the issuance of CADTs, it is a necessary but not sufficient condition for improving the welfare of the IPs. Concomitant activities that increase productivity and livelihood opportunities are needed to bring about improved welfare to the IP communities.

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Climate Change and Philippine Agribusiness: The Case of a Sweet Corn Producing Company

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ABSTRACT

This paper describes how an agribusiness enterprise in the Philippines has been adapting to climate change. Climate change adaptation refers to the ability of an entity to adjust to climate change, or to cope with its consequences. Pentagon Agribusiness, Inc., like any other company engaged in crop production, has not been exempt from the effects of climate change. Pentagon is an agribusiness company which produces sweet corn on a daily basis. In a span of twenty years, the company has managed to become highly regarded in the sweet corn production industry. At present, the company produces corn in more than 200 hectares of land in Luzon, the biggest island in the Philippines. The case study method was used to describe how climate change became a business issue for Pentagon Agribusiness Inc. and also to elaborate on the company's response strategies to climate change. The major effects of climate change include a decrease in sweet corn productivity rates and a decrease in profitability. The company experienced an increase in sales from PhP19 million in 2003 to PhP39 million in 2007. However, in 2008, the company generated annual sales of PhP30 million only which is a 30% decrease from the 2007 figure.

I. Introduction

Climate change is one of the more recent issues which could be considered as the worst threat to global as well as Philippine food security. Among the Philippine crops which are most vulnerable to climate change are rice and corn. Corn is a widely- grown field crop which is of high value mainly for human and livestock consumption.

In the Philippines, there has been a marked increase in yield in corn production from 2006 to 2008, as recorded by the Department of Agriculture Bureau of Agricultural Statistics (DA-BAS). However, during the

first semester of 2009, a decrease in corn production had been observed and this is being attributed to climate change.

Corn production in the country is seasonal in nature. Most corn farmers plant seeds in bulk and harvest in large quantities. One of the biggest corn producers in the country is the Pentagon Agribusiness, Inc. The company is an agriculture-based business which focuses on producing Japanese sweet corn. They are known for their capability to supply fresh sweet corn on a daily basis to supermarkets in the greater Luzon area.

This paper focuses on how Pentagon Agribusiness, Inc.'s operations have been affected by climate change and describes its strategic responses to this phenomenon. Hopefully, this paper can give crop production entities insights on how to minimize the impact of climate variability on productivity and profitability. Policy-making and support institutions can also be provided with ideas on how they can help crop production companies cope up with the challenges of climate change.

II. Review of Literature

As early as 2005, climate change studies had already anticipated that future climate will experience an appreciable increase in temperature, changes in the spatial-temporal distribution of precipitation, and an increase in the frequency and intensity of extreme weather events. The frequencies of occurrence of successive wet and dry periods such as El Niño, La Niña, tropical cyclones and typhoons with strong winds were also then expected to increase. Indeed, in recent years, typhoons have begun to be experienced during periods when they were less expected (e.g., November or December). Thus, crop producers can no longer rely on suggested planting calendars. Rice and corn production have been the most affected as the aforementioned climate change-related events coincide with the period when rice and other crops are about to be harvested, or when the second crop has been planted (Lansigan, 2005).

In relation to the effect of climate change on crops, Lansigan (2005) cited that in the case of rice, climate variability affects rice growth and determines the various crop processes and activities in rice production such as planting date, duration of crop growth, crop yield, and also management practices in rice production. He added that the occurrence of extreme climate variability such as El Niño or La Niña events characterized by a prolonged dry spell or a period of heavy rainfall coinciding with the critical stages of crop growth and development may lead to a significant reduction in crop yields and extensive crop losses. He also cited that statistics on rice production and productivity in the Philippines (PhilRice-BAS, 2000) show that the observed declines in production and yield coincide with the occurrence of El Niño events and that rice production has declined during these extremely dry periods since crop productivity or yield level has decreased and the area planted with rice has been reduced to adapt to the anticipated drought period.

A study by the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development – Department of Science and Technology (PCARRD-DOST) showed that in the case of selected municipalities in Pampanga, Camarines Sur, Catanduanes, Bulacan, and Zambales where farming is the major source of income, respondents experienced food shortages due to the El Niño phenomenon (Environmental Management Bureau, undated).

On the other hand, Alibuyog (2008) determined the effect of climate change on the growth and yield of sweet corn planted during the dry and wet season through a simulation study using the Decision Support Systems for Agrotechnology Transfer (DSSAT 3.5). He found that the growth and yield of sweet corn can be significantly affected by climate change. An increase of 20C in the air temperature can result in a significant decrease of leaf area index and grain yield of corn during the wet season. On the other hand, a 50% decrease in rainfall, as in the case of El Niño, however,

significantly decreased the grain yield of WS crops by about 24%.

Included among the adaptation practices and strategies cited by the Environmental Management Bureau are : 1) diversification of crops and livelihoods; 2) use of more resistant crop varieties; 3) irrigation solutions; 4) changes in timing of farming activities, in land use and in farm location; and 5) development of simple measures for handling rapid harvesting and post harvesting (Environmental Management Bureau, undated).

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) as cited in Agriculture Business Week (2010), on the other hand, cited recommendations for adapting to climate change in developing countries. Among others, these include: 1) promotion of economic diversification – that is, to reduce dependence on climate-sensitive resources through the improvement of food security through crop diversification, development of local food banks for people and livestock, and the improvement of local food preservation; 2) assemble, document and disseminate a comprehensive and action-oriented database of adaptation options of different farming and livelihood systems and agro-ecological zones; 3) access to credit and crop insurance by using catastrophic or weather-risk insurance and index insurance (insurance linked to a particular index such as rainfall, humidity, or crop yields rather than actual loss) as a new climate risk management tool in developing countries; and 4) having policies that contribute to value chains in the agricultural sector and smallholder farmer participation in these value chains (ICRISAT 2010)

Currently, there is a dearth of studies on how profit-oriented agribusiness firms are affected by climate change and how these firms strategically respond to climate variability. This study therefore attempted to contribute to the limited literature on the impact of climate change on food production companies and the adaptation strategies these companies employ to cope up with climate change.

III. Objectives

This paper aims to:

1. Discuss the impact of climate change on the operations and the financial performance of a sweet-corn producing company.
2. Describe the company's strategic responses which minimized the effects of climate change and enabled it to take advantage of opportunities.
3. Provide crop production entities insights on how the impact of climate variability can be minimized and also provide support institutions entry points on how they can help crop producers adapt to climate change.

IV. Methodology

The case study method was used to describe how climate change became a business issue for Pentagon Agribusiness Inc. and also to elaborate on the company's response strategies to climate change. In-depth data on past and current production and marketing operations and strategies of the company was gathered through personal interviews with the company's managers. Information about the company's strategic responses to climate change was also derived and analyzed.

The company's monthly productivity rates in three (3) seasons and financial statements from 2003 to 2008 were gathered to have empirical data on the impact of climate change on productivity and profitability, respectively. Lastly, data on rainfall patterns in Pampanga, Quezon were collected from the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) main office to substantiate the discussion of Pentagon's location-related strategic moves.

V. Results and Discussion

5.1 Overview of Pentagon Agribusiness, Inc.'s Production Operations

Pentagon Agribusiness, Inc. started as a single proprietor type of business with an initial capital of PhP172,000. It was established in December 1989 and formally registered in September 1993 with the Securities and Exchange Commission. The company is owned by Mr. Arleen Valera and is currently managed by its General Manager, Mr. Eric D. Yumul and its Marketing Manager, Mr. Jaime L. Garcia.

Japanese sweet corn is not really from Japan, but rather from Taiwan and India. The term "Japanese" was used by Pentagon for marketing purposes due to the appeal of such a label on consumers. It is considered a snack food for human consumption and is much softer and sweeter than feed corn. Sweet corn is considered fresh produce and can be served in different ways. Sweet corn, both in fresh or cooked form, can be seen sold along roads in provinces and cities by small scale vendors. It can also be seen used for side dishes in different fast food joints. Sweet corn is a variety of corn that can be enjoyed by people as a healthier alternative to snack food.

At present, the company produces corn on more than 200 hectares of land. In a span of twenty years, the company has managed to become highly regarded in the sweet corn production industry. The current production capacity of 30,000 to 40,000 ears per day is attributed to the company's practice of the continuous planting method. It has developed a strong organization that guarantees a continuous supply of corn of consistent quality with an efficient distribution system. At present, the company employs 26 permanent employees and has approximately 400 farm employees distributed among all its production locations.

Pentagon's farms are located in Floridablanca and Mexico, Pampanga. Pampanga is a province in Central Luzon bordered by the provinces of Bataan and Zambales to the west, Tarlac and Nueva Ecija to the north, and Bulacan to the southeast. About five years ago, the company started to create ties with various small farmers to produce part of its volume requirements. This sub-contracting arrangement was conceptualized after Mr. Valera observed the plight of small corn farmers operating near Pentagon's fields who could not sustain their everyday needs from farming.

Under this arrangement, the firm provides corn seeds and other farm inputs as well as production supervision while the small farmers render labor and do plant preparation. At harvest time, the company buys the produce which has passed quality inspection at an agreed price less the total production expenses (i.e., cost of seeds, farm inputs that had been provided and other related production expenses). An agriculture production/marketing cooperative was founded in 2006 with employees of the company as well as its subcontractors as members of the organization.

Pentagon is currently producing two varieties of sweet corn. These are the Bright Jean, which is being imported directly from Taiwan, and the Sugar 75 variety from Syngenta Philippines. The company pays PhP1,200 per kilogram for the landed cost of Bright Jean variety while Sugar 75 costs PhP1,469 per kilogram. Landed cost includes all logistic expenses incurred for the imported seeds.

Pentagon's production system is divided into three categories: own-managed production, subcontracting and buying. 'Own-managed' farms are those lands that Pentagon has been renting, are being supplied with inputs and are being directly managed by the company. 'Subcontracted farms' are those farms owned by small corn farmers that Pentagon has agreed to be supplied with inputs and technical support. 'Buying' is the company's option when there is unmet supply from the first two production systems. Under this strategy, the firm sources corn produce mostly from wet market traders. This system is only used as a last resort due to the higher costs it entails.

The company does not acquire land due to the high investment cost and its preference to have flexibility

where production location is concerned. In this regard, the company is presently renting farm lands which are located in the provinces of Pampanga, Laguna and Quezon. The total area being managed by Pentagon is 117 hectares. On the other hand, the total area of Pentagon Agribusiness, Inc.'s subcontractors is 110 hectares.

5.2 Effect of Climate Change on Pentagon's Operations

Effect on Productivity

The problem these last ten years for the company has been the erratic weather pattern, particularly the rainfall. The company is greatly affected because they have been experiencing losses in recent years due to the weather. The major reason behind its losses is the unsuccessful growth of sweet corn due to the weather and damage from typhoons. The erratic weather patterns have made it very difficult for the company to decide where and when to plant. The erratic weather conditions that the country is experiencing lately are a manifestation of climate variability.

Presented in Table 1 are the productivity rates during the last ten years of Pentagon's operations. The productivity figures show the productivity trend of Pentagon sweet corn. The company owner claimed that the company felt the impact of climate change in its last three years of production and that this was when the usual climatic conditions in its previous farm locations began to change. Rainfall patterns began starting in months when it did not usually happen.

The table below shows the monthly productivity rates from the 2001 to 2009 planting seasons of Pentagon. It is evident that productivity (expressed in terms of number of ears harvested per month in thousand ('000)) has decreased in the last three years. From 2001 to 2004 productivity was also decreasing, but there was no trend existing yet. However, from 2005 to 2009 it became evident that there was a decreasing trend. The company attributes this to the climate variability the country has been experiencing as even when it has been conducting its operations the usual way, there has been a decreasing trend in productivity.

Table 1. Seasonal Productivity Rates, 2001-2009*

	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	Ave. Total
2001-2002	-	-		44.2	46.8	49.2	50.6	48.4	50.2	49.7	47.2	45.0			47.9
2002-2003	-	-	37.0	39.6	45.7	41.7	38.4	48.5	50.7	48.7	43.0	22.2	34.6		41.9
2003-2004	-	-			47.4	46.3	45.7	36.8	41.2	51.5	48.2	34.8	35.8		43.1
2004-2005	-	-		46.7	40.9	42.3	46.7	46.8	47.3	47.2	45.7	34.3		44.3	44.5
2005-2006	-	24.8	28.1		27.5	40.9	47.1	45.6	50.9	45.0	42.5	38.0		36.5	38.8
2006-2007	-	22.1	33.7	30	62.7	45.6	42.1	43.5	49.3	45.5	44.6	39.9			38.3
2007-2008	-	-		26.4	31.8	33.2	42.4	42.5	48.4	47.0	44.0	31.4	24.0		37.1
2008-2009	-	31.4	27.5	22.5	25.7	30.3	33.8	44.4	38.6	47.0	44.3	31.4		34.3	34.7

* number of ears harvested per month (M) in thousand ('000)

Tables 2 to 4 present detailed company data related to productivity in the last three (3) seasons. The company produced an average of 4,023,832 corn ears for the last three seasons (covering the years 2006 to 2009). These figures include the output from the own-managed land harvests and the produce from the company's sub-contracting arrangements. It can be seen that there has been a decreasing trend in the average number of ears harvested per month per hectare

from 38, 251 (in season 2006-2007), 37, 121 (season 2007-2008) to 34,695 (season 2008-2009).

Table 2. Productivity Rates for Season 2006 - 2007

Month	Area Harvested (ha)	Total Ears Harvested	Productivity*
Month 2	3.400	75,200	22,118
Month 3	10.000	337,150	33,715
Month 4	3.080	92,300	29,968
Month 5	1.000	62,700	62,700
Month 6	6.450	294,070	45,592
Month 7	6.450	271,700	42,124
Month 8	12.950	563,400	43,506
Month 9	12.887	635,170	49,288
Month 10	12.151	552,610	45,479
Month 11	8.802	392,840	44,631
Month 12	9.600	383,000	39,896
Month 14	-	-	-
Total	86.770	3,660,140	38,251

* ears harvested per month per hectare

Table 3. Productivity Rates for Season 2007 - 2008

Month	Area Harvested (ha)	Total Ears Harvested	Productivity*
Month 3	-	-	-
Month 4	1.900	50,150	26,395
Month 5	1.100	35,000	31,818
Month 6	6.640	220,425	33,197
Month 7	12.024	510,050	42,419
Month 8	14.386	610,913	42,466
Month 9	11.568	560,234	48,430
Month 10	14.411	677,783	47,032
Month 11	11.179	492,185	44,028
Month 12	13.140	412,800	31,416
Month 13	5.660	135,900	24,011
Total	92.008	3,705,440	37,121

* ears harvested per month per hectare

Table 4. Productivity Rates for Season 2008 - 2009

Month	Area Harvested (ha)	Total Ears Harvested	Productivity*
Month 2	2.165	68,000	31,409
Month 3	14.413	396,650	27,520
Month 4	10.897	245,100	22,492
Month 5	7.300	187,850	25,733
Month 6	21.510	651,985	30,311
Month 7	8.740	295,640	33,826
Month 8	11.981	531,766	44,384
Month 9	14.852	573,157	38,591
Month 10	14.411	677,783	47,032
Month 11	11.179	492,185	44,028
Month 12	13.140	412,800	31,416
Month 14	5.050	173,000	34,257
Total	135.638	4,705,916	34,695

* ears harvested per month per hectare

The company bought sweet corn from local traders to make up for shortages, but this was a risky decision because they were not in control of the corn production. To avoid or minimize the 'buy' option, the company was forced to look for better locations which are relatively insulated from typhoons.

Effect of Climate Change on Productivity Assumptions and Implementation of the Continuous Planting Method

At present, the company makes lower productivity assumptions compared to what they had before. Before, the company had higher productivity assumptions because they already had a routine throughout the years. During the last three years, a new variable emerged - climate change. Pentagon was used to the regular climate of the country and was able to make standards for each farm. However, the last three years have brought in uncertainty to the company's scheduling and implementation of its continuous planting method.

Pentagon Agribusiness' practice of the continuous planting method has been affected by climate change. The president of the company mentioned that he encounters difficulties in setting planting schedules because a productive month in a certain year cannot be necessarily expected to be a productive month the following year. There are also difficulties encountered in picking the right locations at the right time, which is very crucial for productivity.

The company today is adapting to climate change by evading its effects. Forecasting the weather amidst changing climate is very difficult to do at this time because climate change has not been manifesting itself that long in the country, but the company is trying to look for trends and align its planting schedule to this trend.

5.3 Strategic Responses of Pentagon to Climate Change

Identification of New Production Locations and Adjustments in the Timing of Operations

Since the business started in 1989, Pentagon has considered climatic conditions as an important productivity factor due to the fact that corn crops favor dry conditions and less rainfall. Sweet corn is grown for 65 to 75 days (around two and a half months) and it does not favor being soaked in water, especially when it is still growing and even just before it is harvested.

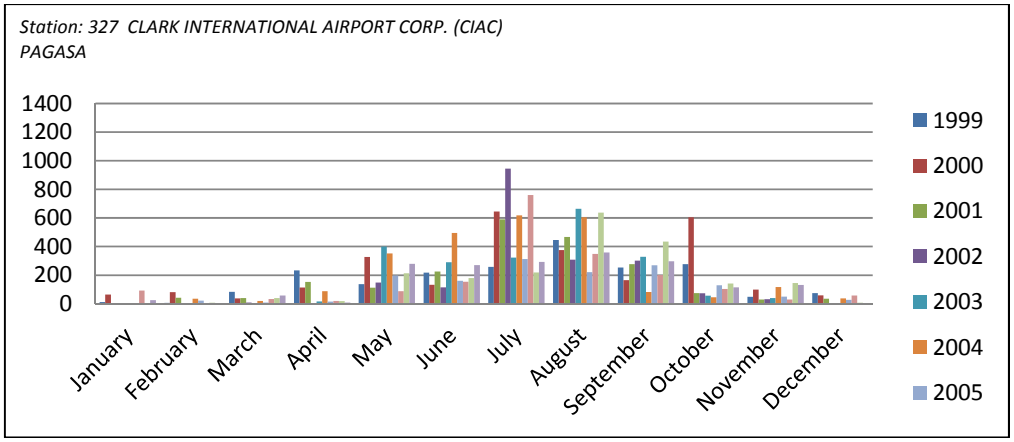
During the earlier years of its operation, it used to plant in Pampanga alone. Then, as the surface temperature increased, a higher amount of rainfall and unexpected typhoons occurred in the area more frequently, Pentagon began to look for other locations so as to avoid the climate change-related conditions in Pampanga.

Pampanga normally does not experience typhoons during the latter months of the year, (i.e., October to December) but from 2006 to 2008, typhoons took place during these months. Throughout its twenty years of operations, it was only during those years that the province had experienced typhoons and heavy rains. Thus, with three consecutive years of typhoons in Pampanga, Pentagon had to make changes in its usual planting schedules. Its continuous farming pattern was being spoiled by the erratic weather occurrences.

One of the company's responses to climate change was to plant during February in Pampanga in order to harvest in April. The company, however, still considered the relocation of its production operations during certain months of the year when there had been failed harvestings in Pampanga. The company, being a daily supplier of corn, needed to find locations where there was less rainfall.

Figure 1 below shows the amount of rainfall in Pampanga during the past 10 years. It can be seen that Pampanga has a triangular rainfall pattern with the month of July having the highest amount of rainfall.

Figure 1. Ten -year Rainfall Pattern for Pampanga



The company searched for new locations to avoid the heavy rains and typhoons in Pampanga. Aside from how much rainfall there was in an area, there were other factors, like availability and cost, which were considered in choosing a location.

Figures 2 and 3 show the amount of rainfall in Quezon and Laguna for the past 10 years (in liters per cubic meter) as gathered from PAGASA-DOST, which has weather stations in each province. It can be seen that in the past nine years, rainfall has not been that excessive from March to September.

Figure 2. Ten-year Rainfall Pattern for Quezon

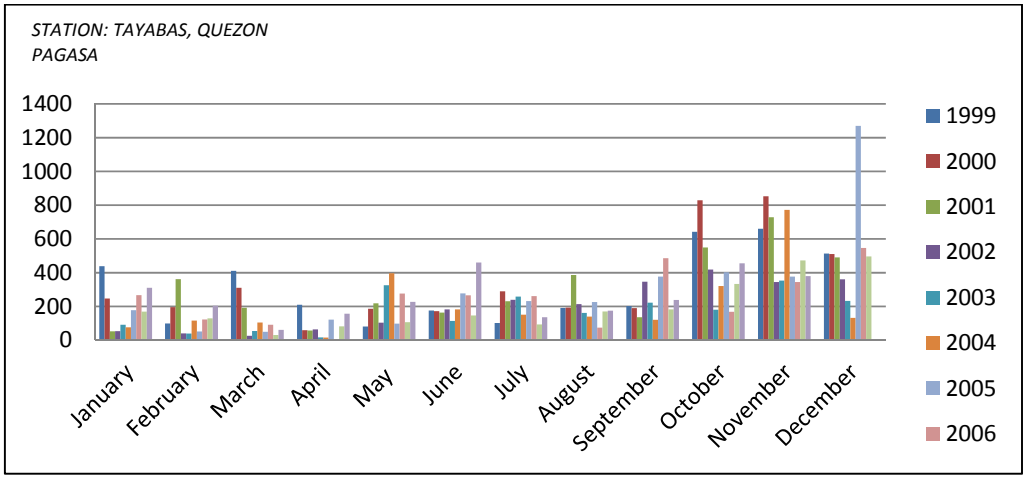
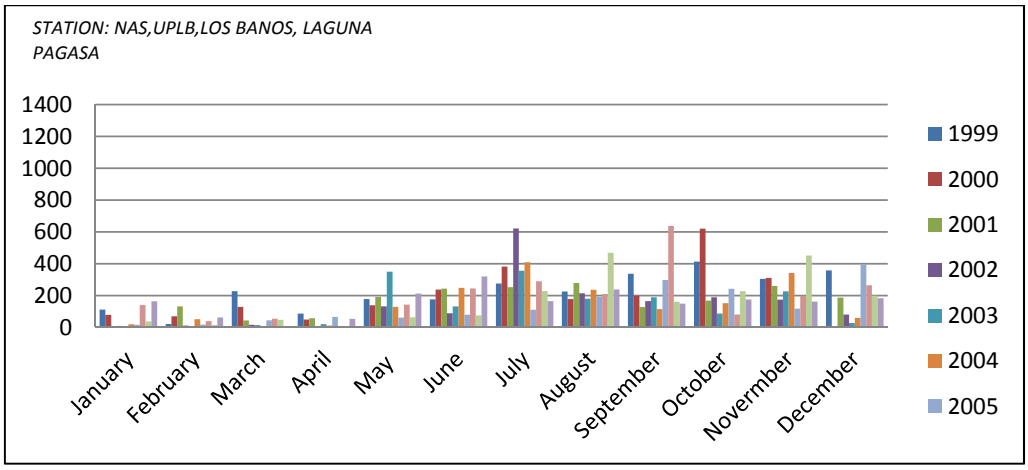


Figure 3. Ten-year Rainfall Pattern for Laguna



Quezon was identified as a new production location. The company traced the sweet corn it bought whenever there was a lack of supply; it came from this province.

Rainfall is not exactly avoided in Quezon. What the company is avoiding is extreme rainfall that could be harmful to sweet corn. Quezon is a good location to grow sweet corn because rains are frequent, but only up to a point where the sweet corn is given enough water to grow sufficiently. Even if the sites in Quezon experience frequent rainfall, the soil compensates for this. Quezon has sandy soil and thus too much water is not absorbed. Quezon is also a good place to plant sweet corn because Mt. Banahaw serves as a buffer for typhoons. This location also has regular rain which irrigates the sweet corn. Irrigation costs are therefore reduced.

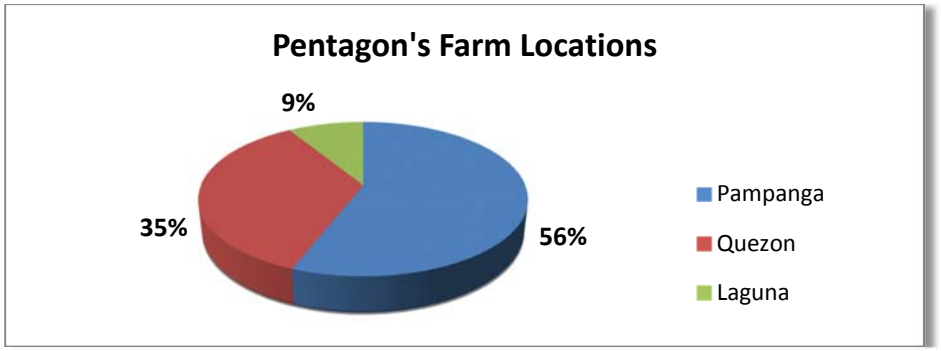
On the other hand, in the case of Laguna, its advantage is that the lands are sloping, causing water from rainfall to flow in a downward direction. Laguna is also near the Metro Manila markets of Pentagon.

Currently, Pentagon has production sites in Quezon (specifically Sariaya, Candelaria, Lucena and Tayabas) and in Calamba, Laguna. Quezon and Laguna are both located southeast of Metro Manila. The production sites are not used all at once for planting. Pentagon employs a variety of options on where to plant daily. The company plants a certain number of hectares daily depending on the demand, and these can be done in the aforementioned sites.

Figure 4. Pentagon's Current Farming Locations

Figure 4 shows the provinces wherein Pentagon is currently producing sweet corn and each province's corresponding share to total production. The company follows the continuous planting method, which means that there are instances that all sites have sweet corn being grown on them. Pentagon's planting schedule is October 1 to March 15 for Pampanga and March 16 to September 30 in Laguna and Quezon.

A more detailed description of the continuous planting method is as follows. The Pampanga planting areas are utilized during the beginning of the year in order to harvest before the heavy rains arrive. When the sweet corn in the Pampanga area is about to be harvested, simultaneously there is already sweet corn being planted in Quezon.



Even though Pentagon adopted a response strategy to climate change by planting in Quezon, the unexpected weather pattern still managed to adversely affect its sweet corn crops. Typhoons Ondoy, Ramil and Santi passed through the country one after the other and Typhoon Ramil destroyed all of Pentagon's sweet corn during the early days of December.

Furthermore, there are still problems in relation to irrigation in Quezon. Most farmers in the area depend on their crop being rain-fed, but Quezon has recently been experiencing weeks of no rainfall, which makes it difficult for the company to find a water supply. This change in rain pattern requires Pentagon to irrigate. However, tapping water from underground wells for irrigation would be difficult due to Quezon's relatively high elevation.

Changes in Marketing Mix

Product and Positioning

Before climate change, Pentagon Agribusiness had only fresh sweet corn (FSC) as its main product. FSC is subdivided into Good Bags and unbagged. Good Bags contain the Bright Jean variety of sweet corn ears, which are required to be 6 to 8 inches long, with complete kernels and be at an ideal maturity level. The unbagged are supplied to institutional markets like Kenny Rogers, TGI Fridays and Burgoo's in the form of ears.

Unfortunately, climate change affected the product quality of the sweet corn. More of its sweet corn had incomplete kernels per cob and sizes were smaller than expected. Kernels are derived from *buraot* which are sweet corn ears that do not satisfy the standards to be considered as "premium," "cooked cobs" or part of "saleable bags." *Buraot* kernels are still as fresh as premium ears and have high-quality sweet kernels. Aside from the increasing incidence of incomplete kernels, there was also the issue of reducded productivity because of unexpected typhoons and heavy rainfall.

Post-harvest and Distribution Processes

Before, Pentagon only had a sorting and packaging center in Mexico, Pampanga. However, because of its production operations in Quezon, a new sorting and packaging center was established. Pentagon established a second sorting and packaging center in Calauan, Laguna for the harvested corn from Quezon.

In relation to distribution, the company currently utilizes polyethylene bags for its kernel products. Because of the warmer conditions, the polyethylene bags are stored in styrofoam containers packed with ice to prolong the sweetness of the kernels. Supermarkets are obliged to keep the corn in a cool environment constantly up until the kernels are cooked by the SM supermarket attendants within the day.

VI. Conclusion and Policy Implications

Pentagon Agribusiness is one of the many agriculture-based businesses which have been adversely affected by climate change. The major effects have been a decrease in productivity rates (and thus lower productivity assumptions when making production planning) and a decrease in profitability due to an increase in the cost of goods sold from crop damage.

Losses due to weather variability were minimized by the company through the undertaking of production in other locations and adjustments made in the timing of planting.

There were also adjustments made in the marketing mix of the company, specifically the product, positioning, packaging and post-harvest and distribution processes. As the number of corn with incomplete kernels per cob and of smaller sizes increased, Pentagon came up with a new product in kernel form. It repositioned itself as a provider of corn in all forms - from fresh sweet corn, kernels to canned corn. In relation to process, a second sorting and packaging center in Calauan, Laguna was established to be nearer its production operations in Quezon. Lastly, due to the warmer conditions accompanying climate change, polyethylene bags containing the kernels are stored in styrofoam containers packed with ice to prolong the sweetness of the kernels.

This case illustrates how an agribusiness enterprise is coping up with the impact of climate change through its innovative production and marketing strategies. The results of the study demonstrate that effective strategic responses to climate change can result in the minimization of losses and the sustainability of operations.

The production and marketing strategies employed by Pentagon represent only some of the many innovative strategies that can be undertaken by agribusiness entrepreneurs. Though most Philippine-based agribusiness enterprises have no capability to adopt similar innovative practices due to capital constraints and other related factors, they should note that during these times that climate change is going to be more apparent and manifested, they must be able to find opportunities in problems and implement adaptive mechanisms in order to sustain their operations.

Based on the issues faced by Pentagon Agribusiness Inc., food production companies could be assisted by a compilation and dissemination of a comprehensive database of locations where certain crops can be planted in the Philippines in different agro-ecological zones at any given time of the year and also by being provided timely data which could serve as a basis of more reliable productivity assumptions. These entities could also help crop production companies by recommending crop management systems which can minimize potential damage from climate change. Lastly, crop production companies could benefit substantially from the development of post-harvest and marketing equipment and supplies which could help them take advantage of opportunities accompanying climate change (e.g., de-kernelling machines and packaging to prolong the shelf-life under extreme heat of processed agribusiness products).

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