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A study of building the crisis prevention model for the innovation development of green marketing: A case of the automotive industry

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For sustainable operation, business circle not only attaches importance to cultivating external competitiveness, but also values innovation of green technology gradually. Green technology brings along the industries, it enables enterprises toward sustainable development when making the best use of innovative technology. This study aimed to build a crisis prevention model for the innovation development of green marketing. It first explored the theoretical foundations in literature for green marketing, innovation management and crisis management, and developed the expert questionnaire with five major dimensions of 22 projects to detect risk factors. The factors were analyzed and discussed with analytic hierarchy process (AHP), one-way ANOVA, and Pearson product-moment correlation analysis. It also identified the risks and problems implied by crisis factors, so as to build a crisis prevention model for the innovation development of green marketing, clarify the findings by importing expert interview, and develop crisis management strategy for innovation development of green marketing effectively.

Key words: Green marketing, innovation management, crisis management.

INTRODUCTION

In recent years, the topic on green has been valued widely, while sustainable development has gradually become a global focus on environmental issues. Thus, more green-related issues have been raised and respected. World Business Council for Sustainable Development (WBCSD) pointed out that, eco-efficiency is the foundation for business sustainable development, its goal is to meet the demand now and will not jeopardize the needs of future generations; and highlights the increase in resource productivity on the one hand,

reduction in environmental impact on the other hand. To achieve the above objectives, apart from the co-ordination of various environmental protection policies, the most fundamental mean is to improve the impact of product or system on environment and ecology through green design and eco-innovation. O'Hara (1998) also indicated that sustainable development is to safeguard the existence of mankind, the well-being from generation to generation, economic productivity and flexibility and capital stock, including natural capital stocks and environmental regeneration capacity. Automotive industry is one of high-tech industries; regardless of the human resource structures, or competitive advantage, high-tech industry has long been the most important driving force of Taiwan's economic growth. High-tech industry is

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knowledge-intensive and higher value-added, in the face of rapid changes in the operating environment and rapid shortening of product life cycle, it not only attaches importance to cultivating external competitiveness, but also values green technology innovation gradually, so as to strengthen and enhance the core competitiveness and innovation performance, and achieve sustainable operation.

However, how to make good use of green innovative technology to make Taiwan's Hotai Motor towards sustainable development in this period, is the research theme of this paper. It focused on the crisis management in innovation development of green technology, detected the crisis factors and built the crisis prevention model, and thus developed a crisis management strategy. If crisis prevention works well, damage from crisis can be reduced; this study explored in this direction, also gave appropriate recommendations from academic theory and practice in green technology industry. This study investigated the crisis derived from green technology innovation, the problems and solutions are described as follows: (1) development trend of green marketing innovation in automotive industry was discussed; (2) crisis factors in innovation development of green marketing were identified; (3) crisis prevention model for innovation development of green marketing was built; (4) crisis management strategy for innovation development of green marketing was developed.

LITERATURE REVIEW

This study was to explore the crisis prevention model for innovation development of green marketing. First, relevant literature on green marketing was investigated, including green enterprises, green products, green consumption, green supply chain, marketing costs of green product, customer development of green products, green products' customer loyalty, followed by discussion on related literature of innovation management and crisis management. The detection of crisis factor was aimed at Taiwan's Hotai Motor (Chung et al., 2008), possible crisis was further explored and discussed, and then implied risk and problems were found; after that, the crisis prevention model was developed with appropriate response and solution. Based on the crisis prevention model, the crisis management strategy with marketing, innovation and R & D three dimensions was developed, which was proposed to be the reference for the management and development of Hotai Motor; it prevents crisis during innovation of green technology effectively.

Green marketing

Environmental sustainable development must improve eco-efficiency largely, or import green design in product

for, or combine with system innovation, so as to enable enterprises tend to sustainable development. To develop green innovative products, Shimogaki (2002) explored how to re-construct products development procedures and change product development approach. Benetto and Rousseaux (2002) proposed design architecture of green innovation, including analysis, composition, simulation and assessment, decision support four stages, so as to design products and services of green innovation. Based on improvement case of drinking water system, Dijk and Stevels (2002) explored the content of system innovation, and pointed out the distinctions of product innovation and system innovation. And 3R in green design can be considered as a whole, 3R includes reduce, reuse and recycle. Porter and van der Linde (1995) pointed out that improving the environment quality and enhancing competitiveness had been merged into one, no longer in opposing. They also suggested that the one, which takes new environmental standards as a challenge, and meet them head-on with technical innovation, is the real competitive enterprise.

Yang and Hu (1999) stated that, when facing sustained pressure, enterprises how to keep developing, producing and marketing the environment friendly products for strengthening the green competitiveness, would become the turning point for survival and sustainable development. Shrivastava (1994/1995) further pointed out that the enterprise should fulfill the responsibility of environmental conservation, so as to implement the concept of sustainable development. As to the competitive strategy in ecological sustainable, enterprises could incorporate the philosophy of environmental protection into packaging design of their products, which increased product differentiation advantages. Winter (1998) regarded green marketing as a strategic management process; its goal was to meet shareholders' demand, and it added a relatively wider range of conditions on definition of the market. Charter (1992) stressed that the focus of green marketing was: throughout the product life cycle from raw materials acquisition, production, consumption to rejection, the impact on the environment was reduced to the smallest. Peattie (1992) considered green marketing as a kind of management process, which could identify, expect and conform to consumer demand, also brought about profits and sustainable operation. Kotler (1994) stated that green marketing refers to ecological safety products, recyclable and decomposable packaging, good pollution control and more efficient energy operation.

Green innovation

The term of innovation is often classified as product innovation and process innovation. Innovation or extinction has been echoed by many managers (Xu et al., 2001). From ancient times, innovation is a powerful force to promote economic development, enhance productivity

and corporate long-term success. It is a flow activity with stages (Zaltman et al., 1973; Savioz and Sannemann, 1999). Enterprises must effectively manage the flow of innovation, so as to enhance the performance of innovation (Tuominen et al., 1999). Hill and Jones (1998) raised the issue that, the way in response to environmental protection for the past, which was taken by companies in accordance with the command and control, was no longer the most effective; they should take predictive and proactive approach.

With the concept of cleaner production, Chang (1998) divided green innovation into: (1) green product innovation; (2) manufacturing technology innovation; (3) improvement and innovation of production equipment; (4) production line innovation; (5) innovation in waste recycling; (6) innovation in end-of-pipe treatment. Gao (1995) incorporated environmental protection into production, he divided green innovation into: (1) end-of-pipe method: collect, process and deliver generated pollutants; (2) innovation in products, raw materials, manufacturing process and operational management: aim at thorough review and improvement of product design, raw material using, production flow, and operational management, minimize the waste quantity and toxicity in production process; (3) waste recycling: turn the reduced garbage into resources, becoming valuable resources or products.

Crisis management

The so-called crisis is defined as a situation which suddenly breaks out without warning; thus bringing about serious loss of property and life of people, forcing policy makers make decisions and take action to reduce loss in a short period of time. It is different from emergency, hazard, disaster, risk, incident, accident and conflict in the levels; their attributes also have different characteristics, which are noteworthy (Cheng, 2004). Hermann (1972a, b) also made the following three criteria to identify crises: (1) threat is the target built by the authority of decision-making groups; (2) decision-makers must do decision-making in a short period of time in the situational conversion; (3) the event is a surprise to decision-makers. Based on Brecher's (1978) view, the formation of crisis should meet following four sufficient and necessary conditions, and then decision-makers can be aware of it. In his view that the crisis was a situation has the following four characteristics: (1) due to changes from internal and external environments; (2) the situation threatens the organization or decision-makers' basic values and faith; (3) the possibility that the situation triggers hostile states is increased; (4) the situation directly threatens the organization or individual goals, but reaction time is restricted.

In the study of crisis management, Fink (1986) defined the crisis as an unstable situation in a period of unstable time, pressing for a decisive change; if adopts and implements the change, the situation will get worse or better, which is usually half and half rate, but the interested parties decide the overall situation. Pauchant and Milburn (1992) suggested that, crisis refers to an incident actually affects the overall system, threatens to the basic assumption, its subjective sense of self, as well as the existing core objective." In recent years, Chu (2002) in his book "Crisis Management" stated that, the definition of the crisis can be interpreted as: (1) astonishment; (2) the crisis threatens to organizations which may have substantial loss; (3) the crisis has time pressure; (4) force the policy makers to make decisions.

Mitroff (2001) defined crisis as an event threatened actually or potentially to the overall organization. Fishman (1999) regarded crisis as a situation with three characteristics: (1) Sudden; (2) make decisions under time pressure and; (3) high threat to the main value. Lerbinger (1997) indicated that crisis is the incident potentially threatened to company's future interest rates, growth and even the survival, it has three characteristics: manager must recognize the threat and believe ‾ such a threat will impede the company's development priority goal, if there is no action taken, suddenly experiences will be worse and irreversible. Fearn-Banks (1996) defined crisis as a major incident, which may hinder normal business transaction and bring about potential threat to business survival. Booth (1993) considered the crisis was a situation that individual, group or organization cannot handle according to normal procedure. Berge's (1988) definition of crisis is that, decision must be immediately made, or else may have more serious consequences; as there are limited options, improper decision-making may have wide influence; the value of enterprise is threatened, as the crisis is not an attempt, organizations play a more minor role; time pressure; enterprises has very short response time, crisis communication situations involve intense changes in multiple relationships. Bland (1988) found that the crisis is a serious accident, which caused adverse publicity on personnel security, the environment, or the company, the credibility of its products, which made the corporation in a dangerous edge. Deutsch (1982) considered that crisis should have four characteristics: crisis includes an important turning point for different results; some decisions must be made; at least one party's main value is threatened; decision must be made under time pressure".

RESEARCH METHOD

This study aimed to build a crisis prevention model for innovation development of green marketing. It identified the possible crisis factors of the case study, Hotai Motor, and analyzed the factors with AHP, reliability analysis, one-way ANOVA, single-sample t-test, Pearson product-moment correlation analysis, and regression analysis The model was built and explored, and suggested were proposed.

Research framework and hypothesis

In the first stage of this study, the possible crisis factors of Hotai Motor were identified, the crisis prevention model was built based on them, and then crisis strategy was developed; research framework (Figure 1) was collated into five dimensions, including: green consumption, green supply chain, marketing costs, customer development and customer loyalty of green products. The definition of green marketing in this study: (1) from raw materials, manu-facturing, design, to consumer use, after-sales service are all in compliance with the spirit of environmental protection; (2) the spirit and concept of environmental protection are widely used in corporate image, and they are promoted to internal staff and external customers. If the marketing is wrong, resulting in product sales crisis, for example: product unsalable, increasing marketing costs, reduced customer loyalty, reduced profits and so on. Therefore, the assumption of this study is: green marketing impacts on innovation development of green technology.

Green product and consumption has become one of the ways towards sustainable development, which is international famous. So this study took Hotai Motor as research subject, base on above scholars' view of green and definition of green consumption, 4R proposed by Liu et al. (2000): refuse, reduce, reuse and recycle, were categories of content analysis for Hotai Motor's green consumption. Therefore, this study developed sub-hypothesis H_1: green consumption impacts on innovation development of green marketing. With the raising awareness on environmental protection and sustainable development, industrial circles' concept has varied gradually from the previous pollution control into pollution prevention; also the passive strategy at pollution emissions reduction has become an initiative strategy at product and process. In recent years, large enterprises have instilled environmental requirements in the supply chain management, therefore, how to bring product design, manufacture, material procurement, specifica-tions and supplier performance assessment into environmental considerations, it has gradually become an important topic. And the relation between environmental protection and industrial manage-ment has been further integrated into supply chain management, one-sided environmental protection measures have been insufficient to meet the industry demand for proactive strategy. While enterprises make efforts in the supply chain upstream and downstream, paying more attentions to environmental benefits of product. Therefore, this study addressed five major dimensions for green supply chain in enterprise: (1) environmental performance evaluation; (2) green procurement; (3) supplier management; (4) Environmental design; (5) the development of product recovery. The sub-hypothesis H_2 of development is: Green supply chain impacts on innovation development of green technology.

In order to reduce the marketing costs that a new product enters new markets and creates a new brand, in recent years, enterprises' brand extension strategy has been widely used in new product listing. The strategy can effectively reduce marketing costs, so original brands' attributes are easily associated to extension product, and the extension products are easier to get consumer acceptance. This study developed sub-hypothesis H_3 for how to reduce marketing costs: marketing cost impacts on innovation development of green marketing.

The cost to develop a new customer is about five times of that to keep an original customer, so how to maintain the existing cus-tomers to create profits is one of the key factors for the company. The work of developing potential customers requires a series strategic formulation and implementation on the market, product and customer. As to the market, first it is necessary to do segmen-tation analysis on general consumer market, and then define the primary target market segment. Peppers and Rogers (1993) mentioned the key concepts in the book "The One to One Future": (1) Customer share: In addition to the importance to invest more capital and energy in the whole market, it should also pay due attention to raising the overall turnover, and the thinking about how to improve a single customer's turnover, that is, committed to enhancing each customer's total consumption volume. (2) Customer retention and development: the cost to develop a new customer is five times of that to keep an original customer, while the majority of enterprises averagely have an annual loss of 25% customers. So Peppers and Rogers (1993) suggested that, if the loss rate of customer would be reduced by 5%, there will be a 100% profit growth. (3) Repeat purchase: If so one customer's total consumption is upgrade, the marketing costs for loyal customer can be reduced, thus enjoy a more long-term profit. (4) Dialogue with consumers: Peppers and Rogers (1993) mentioned one important concept: The important thing does not lie in how you understand all of customers, but the level you understand. Therefore, there should be two-way interactive communications between customers and companies to improve the trust and loyalty. In this study, sub-hypothesis H_4 was developed based on Peppers and Rogers' (1993) key concept: customer development impacts on innovation development of green marketing.

Customer loyalty is used to measure consumer's attitude toward the core parent brand, it means consumers' level of brand recognition and willing to purchase the same brand once again. Many scholars even directly expressed customer loyalty will be the main sources of competitiveness for enterprises (Frederick, 1996; Parasuraman et al., 1991). Therefore, this study developed sub-hypothesis H_5 based on research on five dimensions of customer loyalty: customer loyalty impacts on innovation development of green marketing.

Research subject

The research subject of this paper was Toyota's general agent in Taiwan, Hotai Motor, its upstream includes Toyota Motors, Hino Motors and Hotai Motor with Taiwan's capital and technical co-operation, downstream has small car dealers and large cars Changyuan. Key business functions of Hotai Motor, including mar-keting planning, market research, product planning, development and integration of information systems, education and training planning, dealer operation management, after-sales service system planning and coordination of vehicles and spare parts logistics. Hotai Motor is Toyota Motor's investment company in Taiwan; it is the general agent for Kuozui Motors. The main business is sales on Lexus, Toyota, Hino Motors and related after-sales service. Becoming the most trusted benchmarking automotive group, is Hotai Motor's vision since it has founded. In recent years, Hotai Motor is completing this vision step by step. It not only reach new heights in the performance operating, it has also become an annual sales champion once again in 2004 in Taiwan; its new car sales even reached 100,000 for the third time last year; additionally, Hotai Motor's CS (customer satisfaction) Culture also allowed the company in 2003 won the car sales industry's first National Quality Award.

Hotai Motor has felt this irresistible trend of environmental protection, and it has actively involved in it; since 2001, it has officially involved in Toyota's plans to promote global environmental protection, and it has also set up an environmental committee in the company, so as to promote environmental protection related matters. Hotai Motor will continuously carry out a series of comprehensive and integrated pollution control and prevention to enhance the environmental management performance, so as to achieve coordinated care of sustainable operation and ecological environment. In a series of environmental protection programs and activities, it is scheduled to start from the distributor, branch service factory and Yangme logistics centers, and then gradually extended to Hotai, distributors and various contract factories. Important policies to promote environmental protection are as follows: (1) support the Government's environmental policy, and promote
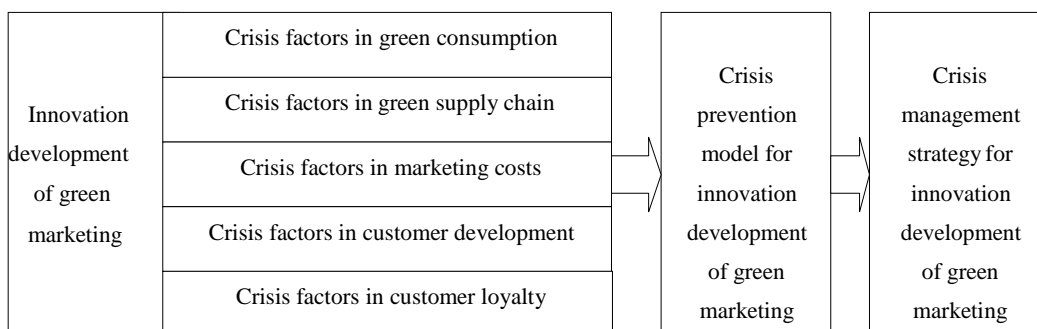
Innovation development of green marketing	Crisis factors in green consumption	Crisis prevention model for innovation development of green marketing	Crisis management strategy for innovation development of green marketing
	Crisis factors in green supply chain		
	Crisis factors in marketing costs		
	Crisis factors in customer development		
	Crisis factors in customer loyalty		

Figure 1. Research framework.

environmental improvement activities; (2) improve the pollution control equipment, reduce operational emissions; (3) recycling of resources, minimize environmental impact; (4) enhance people's environmental awareness and implement a comprehensive environmental management. In response to these four principles, the goals and mission of several stages are developed, the recent primary environmental objectives are: (1) view all contract plants and logistics centers to ensure they conform to environmental laws and regulations; (2) develop improvement plans to the one which has been reported by people or written bills of penalty by environmental unit; (3) assist the contract factories to deal with difficulties in existing environmental protection, such as auto-glass recycling.

Research and analysis methods

First, this study used expert questionnaire, after inspection and collation in initial screening, invalid questionnaires were excluded, and the valid ones were encoded and typed, through SPSS for Windows 10.0 statistical analysis software package. It is analyzed as follows:

The expert questionnaire

Based on literature review and interviews of industrial and academic circles' experts, questionnaires were developed; complemented by the one of high-level managers in industrial circle in (Toyota Motor Lexus), it is hoped to build a crisis prevention model for innovation development of green marketing. Finally, professional managers were interviewed once again to clarify the meaning of various findings, so as to develop crisis management strategy effectively. Expert questionnaire covers five dimensions of 22 projects, shown in Table 1.

Analytic Hierarchy Process (AHP)

AHP, multi-Criteria developed by T.L. Saaty for the US Department of Defense, Professor in Pittsburgh University in 1971; it mainly applies to decision-making with uncertain situations and a number of evaluation factors (Saaty, 1980; Saaty and Vargas, 1982). With the use of organizational structure, hierarchical structure with mutual impact is established, which can give effective decision-making to complex issue, or give effective decision-making in uncertain risk, or search for consistency in divergent judges. After continuous use, amend and development, AHP method become increasingly sophisticated, and try to apply it in priority decisions,

planning, resource allocation, forecasting, investment portfolios and so on; Professor Satty also proposed a complete methodology in 1980, and published book "The Analytic Hierarchy Process". AHP method has been widely used in many areas since developed, the main application is in the decision-making, it has been currently applied to the following 13 kinds of decision-making problems abroad (Saaty and Vargas, 1991): (1) Setting Priorities; (2) Generating a Set of Alternatives; (3) Choosing a Best Policy Alternative; (4) Determining Requirements; (5) Making Decision Using Benefits and Costs; (6) Allocating Resources; (7) Predicting Outcomes-Risk Assessment; (8) Measuring Performance; (9) Designing a System; (10) Ensuring System Stability; (11) Optimizing; (12) Planning; (13) Conflict Resolution.

Reliability analysis

The quality of a test should have a moderate degree of difficulty, and high identification, the most important thing is validity and reliability. The so-called validity (also known as the correctness) is that a test can really measure the ability or function, that is, to achieve the purpose of testing is an effective test, which is called validity. While reliability (confidence level) refers to the scores measured by a test are credible or stabile, that is, if the same group of subjects are tested with the same kind of paper, the scores should have consistency, so reliability is the measurement of consistency.

Descriptive statistics analysis

Descriptive statistical analysis is to illustrate the sample structure, that is, the questionnaire data is done the single variable descriptive analysis; the study used this method to illustrate the variable average and standard deviation, subjects' views of variables were described.

One-Way ANOVA

One-way ANOVA is a statistical method to explore relationship between single response variables and explanatory variables. The purpose of One-way ANOVA is to compare whether different groups' responses have differences, so as to explore the functional relationship between variables is significant.

Single sample t test

T test is applied in a single sample's average or comparison of two

Table 1. Five dimensions of 22 projects.

[C] Green consumption	
C1	Refuse to use non-green products
C2	Reduce the use of non-green products
C3	Choose reusable products
C4	Choose recyclable products
[D] Green supply chain	
D1	Environmental public record
D2	Implement hazardous waste management
D3	Pass the ISO 14000 certification
D4	Implement environment-friendly packaging
D5	Implement the management of hazardous air pollution emissions
[E] Marketing of green products	
E1	Brand extension strategy
E2	Enterprise's operating performance
E3	Enterprise's economic value-added
E4	Brand management capacity
[F] Customer development of green products	
F1	Customer share
F2	Customer retention and development
F3	Frequency of repeat purchase
F4	Willing to communicate with customers
[G] Customer loyalty of green product	
G1	Repurchase Intention
G2	Repeat purchase intention
G3	Purchase the company's other products or services
G4	Price tolerance
G5	Recommend to others

groups' average; according to Likert scale, when it is in a significant level, it tests whether the sample average is different from the weight average.

Pearson's product-moment correlation

This study used Pearson correlation analysis to explore the correlation between variables; and as the values of correlation and standardization coefficients are not affected by variable characteristics, Pearson's r values will be in the range of -1 and + 1. When Pearson's r value getting close to plus or minus 1, it means that the correlation among the variables is more obvious (Chiou, 2002).

DATA ANALYSIS AND RESULTS

Based on the research framework and hypothesis, the questionnaire recovered were collated and inputted; analysis and test were done through Expert Choice 2000 and SPSS for Windows 10.0, Chinese version, so as to understand the cognitions about green technology innovation by various departments in Hotai Motor. First, the questionnaire sample was done the basic data analysis, and then hypothesis testing among various variables were done to test whether the empirical results were in line with the theory.

AHP

AHP method is applied to the extraction of critical success factors, experts in the industry are interviewed through hierarchy questionnaires, and the so-called experts are in accordance with the definition in Cihai from Chunghwa Book Company: a person with special knowledge in a certain field. Therefore, this study defined experts as the people at least with a position above specialist in the industry, or above deputy engineer in related research institutions. The people interviewed were Hotai Motor's general manager, supervisors and deputy supervisors from every department, as well as specialists, a total of 50 questionnaires were issued, and

then the recommendations of experts for research program were integrated, which was the direction of follow-up evaluation. In this study, Expert Choice 2000 was taken as one of data analysis tools. In this stage, based on five major dimensions of 22 projects in Table 1, hierarchy of crisis management factors was established for Hotai Motor's innovation. 50 questionnaires were issued, 30 were recovered, and response rate was 60%. Herein, there was no invalid questionnaire and a total of 30 valid questionnaires, so effective response rate were 60%. According to study, the factors with the highest weight in descending order were: marketing costs of green products (23.7%), customer development of green products (21.5%), green supply chain (21.3%), customer loyalty of green products (20.7%) and green consumption (12.8%). According to the weights in evaluation dimension, marketing costs of green products has the highest weight, the management staff attaches considerable importance to the marketing costs of green products; while customer development and green supply chain have similar weights, it means that the management level attaches similar importance to them; among them, green consumption has the lowest weight, so it impacts little on green marketing.

Sampling and issuing questionnaire

In this study, the target of questionnaires was management office staff in Kao-Du Toyota Motor Ltd., Hotai Motor, and questionnaires were issued to supervisors, deputy supervisors, specialists and administrators. Paper questionnaires were issued mainly, based on stratified proportion sampling, the minimum number of samples was 59.2, so this study has issued a total of 60 copies, 39 copies were recovered, and effective response rate was 65%.

Reliability and validity analysis

The quality of a test should not only have a moderate degree of difficulty, as well as high discrimination, the most important thing is validity and reliability. The so-called validity (also known as the correctness) is that a test can really measure the ability or function, that is, to achieve the purpose of testing is an effective test, which is called validity. While reliability (also known as confidence level) refers to the scores measured by a test are credible or stabile, that is, if the same group of subjects are tested with the same kind of paper, the scores should have consistency, so reliability is the measurement of consistency. Validity of the questionnaire refers to how a test or scale can correctly measure; it is the accuracy, reliability or validity of test material. In preparation of attitude scale, the content validity ratio (CVR) is used to represent the expert's validity, and the prepared questionnaires should be audited by scholars, experts and

practitioners in the field, so as to determine whether the construct and question content are proper, which is the initial screening, known as the expert validity. Although the expert validity is a consistency indicator among experts, rather than content validity in itself, it could serve as a reference for construct and question relevancy, so the study on expert validity as construct validity of the questionnaire in recent years has been more general (Wu and Tu, 2005). In this study, first expert validity in content validity was adopted, high-level managers and directors in Toyota Motor were invited, which provided comments to this scale, and evaluate the relevancy of constructs and questions.

The reliability or confidence level refers to the consistency or stability of test results, and test reliability is a measurement of lasting consistency. In the Likert attitude scale of this study, the most frequently used method for reliability is Cronbach's α coefficient. Scholar Kerlinger (1986) considered reliability could measure the reliability, consistency and stability of tools (questionnaires). Therefore, this study used Cronbach's α coefficient as reliability indices. Generally, as long as α coefficient is above 0.5 or 0.6, it can be accepted; if α coefficient ranges between 0.7 and 0.9, it is a high reliability value; if α coefficient is less than 0.3, it means a low reliability. According to reliability testing results in this study, the Cronbach's α values of variables are all above 0.75, therefore, the questionnaires of this study have considerable reliability, as shown in Table 2.

Structural analysis of sample data

Study respondents' basic information includes: gender, age, marital status, education level, service sector, service years and job title for descriptive statistics. The 14 respondents were male, accounting for 35.9% of all the samples; females were 25, accounting for 64.1% of all; women were more than men. As to the employees participated in the questionnaire, the majority were in the age of to 26 to 35 years old, with a total of 24 people, accounting for 61.5%, followed by 36 to 45 years old with 9 people, accounting for 23.1%, and the least was 46 years old, only 2 people and accounted for 5.1% of all samples. As to their marital status, mostly unmarried, a total of 22 people, accounting for 56.4%, while a total of 17 were unmarried, accounting for 43.6%. As to the distribution of education level, most had university degrees, with a total of 18 people, accounting for 46.2%, followed by the college degree with a total of 13 people, accounting for 33.3%; the one below general and vocational high school, as well as the one above the master degree had the same and least proportion, each has 4 people, accounting for 10.3%, respectively. As to the service sector, mostly in service departments, with a total of 12 people, accounting for 30.8%, followed by the finance department, with a total of 11 people, accounting for 28.2%; and vehicles and management departments

Table 2. Reliability of measure variables in this study.

Measure variable		Amount of questions	Cronbach's α	
Green marketing	Green consumption	4	0.8931	
	Green supply chain	5	0.9337	
	Marketing of green product	4	0.9216	0.9588
	Customer development of green product	4	0.9185	
	Customer loyalty of green product	5	0.9270	

had the same number, 8 people with 20.5%, respectively; the department of infrastructure and maintenance had 0 people. As to service years, most were 1 to 3 years (excluding), with a total of 9 people, accounting for 23.1%, while the number below one year (excluding) and 3 to 6 years (excluding) were the same, 5 people with 12.8%, respectively. As for job title, most were administrators, with a total of 13 people, accounting for 33.3%, followed by the specialists, with a total of 11 people, accounting for 28.2%; and the number of supervisor was 7, the number of deputy supervisor was 8, respectively, accounting for 17.9% and 20.5%.

Descriptive statistics

This section had an all-embracing description of the average and standard deviation for each research variable, so as to understand the general view of sample; if the standard deviation of variable is less than 0.8, it means there is little difference in views. There are five dimensions in green marketing: "green consumption", "green supply chain", "marketing costs of green product", "customer development of green product" and "customer loyalty of green product"; the sum of average in all dimensions was between 3.62 to 3.87, and further according to t test (test value was no opinion), on the whole, close to the "agree"; among them, the average of "choose reusable products (C3)" is 4, it means the subjects "agree" the view. In terms of green marketing dimensions, the max average number of green consumption is 3.87, with a standard deviation of 0.83, followed by the marketing of green products, with a standard deviation of 3.77 and an average of 0.93, the minimum is green supply chain, with a standard deviation of 3.62 and an average of 0.99.

ANOVA of personal attributes

Here, we analyzed the grouped data, the respondents data was classified as "gender", "age", "marital status", "education level", "service sector", "service years" and "job title"; seven groups, which were in a way of independent variable, so as to explore the degree of difference among variables, respectively. One-way ANOVA and

Independent T Test were used by this section to test the differences, if α value reaches 0.05 significant level, and then carry out Post Hoc Multiple Comparisons of LSD for post-comparison.

Gender in t test of various research variables

In the dimensions of green marketing, the significance of different genders in this research variables are both greater than 0.05, so there is no significant difference, it means male and female employees have no significant difference in the feeling and cognition of green marketing.

Age in ANOVA of various research variables

From the results of the analysis in Table 3, the "26 to 35 years old" employees more agree that to reduce in-house use of non-green products impacts on green consumption than the "36 to 45 years old". The former more agree choosing reusable products impacts on green consumption than the latter; if Hotai uses reusable containers and other items, or rent and share the items not frequently used as far as possible, the harm to the environment can be reduced. Finally, in comparison to the "below 25 years old" and "36 to 45 years old", the "26 to 35 years old" more agree that to choose recyclable products impacts on green consumption. Currently, Hotai have adopted many recyclable plastics in manufacturing, in the product Life Cycle Assessment, not only reduce CO_2 emissions significantly, but Dismantling Labeling is also used to recover and dismantle vehicle structure. Inside and outside vehicles, the "Toyota Super Olefin Polymerization (TSOP)" is used, which is thermoplastic plastic material. It is obvious that employees of different ages in Hotai have different cognition and significant differences in whether to reduce the use of non-green products, to choose reusable and recyclable products.

According to analysis results in Table 3, employees of different ages have different views on the green supply chain. In comparison to the "below 25 years old" and "36 to 45 years old", the "26 to 35 years old" more agree that the implementation of waste and air pollution emissions management, environment-friendly packaging and passing ISO 14000 certification impact on green supply

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Table 3. ANOVA of various dimensions in age and green marketing.

Dimension	Variable	Question	F test	Significance	LSD
		C1	1.051	0.382	2 > 3
	Green consumption	C2	3.358[*]	0.030	2 > 1
		C3	3.578[*]	0.023	2 >1, 3
		C4	6.515[**]	0.001	—
		D1	2.749	0.057	2 >1, 3
		D2	3.516[*]	0.025	2 > 1, 3
	Green supply chain	D3	5.657[**]	0.003	2 > 1, 3
		D4	4.309[*]	0.011	2 > 1, 3
		D5	3.640[*]	0.022	2 > 1, 3
		E1	0.372	0.773	—
Green marketing	Marketing of green product	E2	0.567	0.640	—
		E3	0.551	0.651	—
		E4	0.395	0.757	—
		F1	1.433	0.250	—
	Customer development of green product	F2	0.065	2.639	—
		F3	1.457	1.267	—
		F4	0.301	0.243	—
		G1	2.793	0.055	—
		G2	4.205[*]	0.012	2 > 1, 3, 4
	Customer loyalty of green product	G3	2.569	2.143	—
		G4	1.628	0.200	—
		G5	0.112	0.070	—

[1]: * $P < 0.05$; * * $P < 0.01$; * * * $P < 0.001$; [2]: "1" means below 25 years old, "2" means 26-35 years old, "3" means 36-45 years old, "4" means above 46 years old; [3]: for the code of question refer to Table 1; [4]: "-- means no difference."

chain. In order to achieve lower emissions of pollution and renewable energy, Toyota has been actively developing Hybrid System for more than 40 years, its HSD Hybrid-engine technology uses gasoline and electricity as power source, which effectively inhibit carbon dioxide and other chemical substances emissions, 80% emissions of pollution are reduced, avoiding environmental damage and energy disappear and giving the Earth a better future. Its contract factories have now also passed ISO14001 environmental management system standard, and was awarded the "Model factory of Corporate Environmental Report" by Industrial Development, MOEA. Hotai Motor plans environmental protection work in accordance with Toyota Earth Charter, covering the "green product", "green production", "green procurement" and "education, promoting" four themes to implement environmental protection policies, fulfill corporate and social responsibility. In marketing dimension of green product, different ages do not affect the research variables in this dimension; as p values are all greater than 0.05, there is no significant difference, it means the respondent age has no significant difference in feelings and cognition on marketing of green products.

In customer development of green products, different ages have no impact on research variables in this dimension, as p values are all greater than 0.05, there is no significant difference, it means the respondent age has no significant difference in feelings and cognition on customer development. From Table 3, in comparison to the "below 25 years old" and "above 36 years old", the "26 to 35 years old" more agree that repeat purchase intention impacts on customer loyalty of green products. The customer loyalty means whether the customer is willing to long-term support a certain product or service, and many scholars even directly express loyal customers will be the main source of competitive advantages for enterprises. As to the age samples in this investigation, most are 26 to 35 years old, with a total of 24 people, accounting for 61.5%, so the majority of tested employees expressed that repeat purchase intention had an impact on customer loyalty of green products.

Marital status in t test of various research variables

In the dimensions of green marketing, with the exception

of research variables customer retention and development: $p < 0.05$, it indicates unmarried employees more agree green marketing than married employees; and the p values of remaining variables are larger than 0.05, there was no significant difference, it means respondents' marital status has no significant difference in the feelings and cognition on green marketing.

Education level in ANOVA of various research variables

Through one-way ANOVA, whether the impact of different education levels on various dimensions of green marketing has significant differences was explored, according to research, the p values of various research variables were all larger than 0.5, it means the respondents with different education levels have no significant difference in the feelings and cognition on importance of green marketing.

Service sector in ANOVA of various research variables

Here one-way ANOVA was used to explore whether the impact of service sectors on various dimensions of green marketing has significant differences; based on research, with the exception of research variables enterprise's economic value-added: $p < 0.05$, it indicates significant; and the p values of remaining variables are larger than 0.05, it means respondents in different service sectors have no significant difference in the feelings and cognition on green marketing. While most the staff serving in the finance department understand how much the company spend in marketing, and the brand value has always been pursued and created by various companies, and its input marketing costs will directly affect the brand management capacity. Appropriate input marketing costs has a positive impact on enterprise economic value-added. Therefore, from the results of this table, the employees in "finance department" more agree that enterprise economic value-added impacts on green products marketing than the one in "service department".

Service years in ANOVA of various research variables

Again one-way ANOVA was used to explore whether the impact of service years on various dimensions of greenmarketing has significant differences; based on research, with the exception of research variables refuse and reduce the use of non-green products: $p < 0.05$, it indicates significant. Compared to employees with service years "one or more years", the one with "one year (excluding)" all agree that to refuse and reduce the use of

non-green products impact on green consumption. When consumers aware of the deterioration of the environment has affected the whole quality of life, they will try to buy and call for the commodity with the smallest impact on the environment, on the one hand, the purpose of consumption is achieved, on the one hand, environmental injury is reduced through the practice of green consumption. And each employee also has the identity of consumer, the concept of green consumption be brought into the company in turn affect the entire enterprise. According to research results, the p values of remaining variables are larger than 0.05, it means respondents with different service years have no significant difference in the feelings and cognition on green marketing.

Job title in ANOVA of various research variables

Such as research shows, in green marketing dimensions, different titles has no impact on research variables in this dimension, because P values are all greater than 0.05, there is no significant difference, it means respondents' job titles have no significant difference in the green R&D dimension.

One-way ANOVA of various research variables

Grouped data was targeted with independent variables to explore the difference. This study used statistical methods of One-way ANOVA to test differences with different demographic variables. If α value reaches 0.05, a significant level, and then carry out Post Hoc Multiple Comparisons of LSD for a post-comparison.

Green consumption

In recent years, in order to response to the safety and environmental regulations, as well as demands from green production and consumption proposed by international organizations, Hotai Motor has many advanced technology and experience on material recycling and application in response to future global green consumption trends. In response to green production, 3R (Recycle, Reuse, Reduce) policy has been actively promoted, for instance: R&D of disposable airbag, so that airbag components can be recovered or reused moderately; reduction of lead-containing products or using lead-free materials, etc., so the majority of respondents' thought that refuse to use non-green products, to reduce the use of non-green products, and choose reusable and recyclable products have an impact on green marketing, research analysis results are shown in Table 4.

Green supply chain

With the raising awareness on environmental protection

and sustainable development, industrial circles' concept has varied gradually from the previous pollution control into pollution prevention; also the passive strategy at pollution emissions reduction has become an initiative strategy at product and process. In recent years, auto-motive industry has instilled green concepts in the supply chain management, therefore, how to bring product design, manufacture, material procurement, specifica-tions and supplier performance assessment into environmental considerations, it has gradually become an important topic. The majority of employees in Hotai Motor agreed when interview: whether an enterprise has environmental public record, or the implementation of hazardous waste and air pollution emissions manage-ment, and environment-friendly packaging, as well as whether the adoption of ISO 14000 certification, all impact on green supply chain, and its analysis results are shown in Table 4.

Green marketing

In order to reduce the marketing costs that a new product enters new markets and creates a new brand, in recent years, enterprises' brand extension strategy has been widely used in new product listing. The strategy can effectively reduce marketing costs, so original brands' attributes are easily associated to extension product, and the extension products are easier to get consumer accep-tance. Employees in Hotai Motor most agreed that brand extension strategy can effectively reduce marketing costs, then the enterprise economic value-added is relative increased, and its analysis results are showed in Table 4.

Customer development of green products

The cost to develop a new customer is about five times of that to keep an original customer, so how to maintain the existing customers to create profits is one of the key factors for the company. However, how to maintain the existing customers and increase their consumption is also important. Peppers and Rogers (1993) suggested that, if the loss rate of customer would be reduced by 5%, there will be a 100% profit growth. So Hotai also focuses on how to keep existing customers, and regularly communicate with them to enhance customer repeat purchase frequency, and the analysis results are shown in Table 4.

Customer loyalty of green product

Customer loyalty is used to measure consumer's attitude toward the core parent brand, it means consumers' level of brand recognition and willing to purchase the same brand once again. Many scholars even directly expressed

that: whether customers have re-purchase intention and repeat purchase intention, or whether customers will buy the company's other products or services with price tolerance, or recommend the products or services to others, all these have impacts on customer loyalty of green products, and the analysis results are shown in Table 4.

Pearson product-moment correlation analysis

This section will perform Pearson product-moment corre-lation analysis (correlation coefficient r) to examine the relevance of various dimensions. Where, when r is greater than 0, it indicates a positive correlation; if r is less than 0, it means a negative correlation; if r = 1, it means a perfect correlation; if r values range from 0.70 to 0.99, it means a high correlation; if r values range from 0.40 to 0.69, it indicates moderate correlation; if r values range from 0.10 to 0.39, it means a low correlation; and if r values are below 0.10, it means a weak or no correlation.

Green consumption

Table 5 shows the analysis results from the respondents in green consumption related dimensions. It can be found that, refuse the use of non-green products and the reduc-tion the use of non-green products have a significant correlation, the correlation coefficient reaches 0.556, it is moderate correlation, it means if staff agrees to refuse the use of non-green products, they would agree with the progressive reduction of non-green products. Refusing the use of non-green products has a significant corre-lation with choosing reusable and recyclable products, the correlation coefficients are above 0.7, high correla-tion, it means staffs agree to reduce non-green products, and select reusable and recyclable products. Also, choose usable products and choose recyclable products have a very significant correlation, the correlation coefficient reaches 0.879, a high correlation, it means they are very important for the development of Hotai Motor. Currently, Hotai have adopted a lot of recyclable plastics in manufacturing, in the product Life Cycle Assessment, not only reduce CO_2 emissions significantly, but Dismantling Labeling is also used to recover and dismantle vehicle structure. Inside and outside vehicles, the "Toyota Super Olefin Polymerization (TSOP)" is used, which is thermoplastic plastic material.

Green supply chain

Table 6 shows the correlation analysis results from the respondents on green supply chain, it can be found: environmental public record and implementation of

Table 4. ANOVA of various dimensions in green marketing.

Dimensions	Variable	Question	F test	Significance	LSD
		C1	5.612**	0.003	3, 4, 5 > 2
		C2	13.771***	0.000	3, 4, 5 > 2
	Green consumption	C3	10.764***	0.000	3, 4, 5 > 2
		C4	12.870***	0.000	3, 4, 5 > 2
		D1	3.628**	0.022	3, 4, 5 > 2
		D2	8.467***	0.000	3, 4, 5 > 2
	Green supply chain	D3	4.073**	0.014	3, 4, 5 > 2
		D4	4.010**	0.015	3, 4, 5 > 2
		D5	5.906**	0.002	3, 4, 5 > 2
		E1	6.865**	0.001	3, 4, 5 > 2
Green	Marketing of green	E2	2.386	0.086	—
marketing	product	E3	7.066**	0.001	3, 4, 5 > 2
		E4	6.241**	0.002	3, 4, 5 > 2
		F1	8.884***	0.000	3, 4, 5 > 2
	Customer	F2	11.597***	0.000	3, 4, 5 > 2
	development of green	F3	4.011*	0.015	3, 4, 5 > 2
	product	F4	12.265***	0.000	3, 4, 5 > 2
		G1	9.237***	0.000	3, 4, 5 > 2
		G2	7.893***	0.000	3, 4, 5 > 2
	Customer loyalty of	G3	9.251***	0.000	3, 4, 5 > 2
	green product	G4	6.838**	0.001	3, 4, 5 > 2
		G5	10.630***	0.000	3, 4, 5 > 2

[1]: * $P<0.05$; * * $P<0.01$; * * * $P<0.001$; [2]: "1" means strongly disagree, "2" means disagree, "3" means no opinion, "4" means agree, "5" means strongly agree; [3]: for the question code refer to Table 1; [4]: "— means no difference".

hazardous waste management have a correlation coefficient of 0.904, a high correlation, it means if the enterprise has that record, it will be able to effectively manage hazardous waste, so as to move towards green business goal; the above two both have a significantly correlated with passing ISO 14000 certification, the correlation coefficients are both above 0.5, moderate correlation, it means that if enterprises recognize environ-mental public record and implementation of hazardous waste management, it will have a significant impact on enterprises passing ISO 14000 certification.

Green marketing

Table 7 shows the correlation analysis results from the respondents on the marketing of green products, from the table it can be found that: the enterprise economic value-added and brand management ability have a significant correlation, the coefficient is 0.905, which is highly rele-vant. Brand extension strategy has significant correlation with both the operating performance of enterprises and

economic added value; the coefficients are 0.653 and 0.777, respectively moderate and high correlation. The majority of staffs in Hotai Motor think brand extension strategy can effectively reduce costs and enhance brand performance and viability, then the enterprises' economic value-added is relative improved.

Customer development of green products

Table 8 shows the correlation analysis results from the respondents on the customer development of green pro-ducts, from the table it can be found that: the customer share has a significant correlation with customer retention and development, the coefficient reaches 0.848, a high correlation; and willing to communicate with customers is significantly correlated with customer share, customer retention and development, and customer repeat pur-chase frequency, coefficients are all above 0.7, which are highly relevant, and if staffs can take the initiative to communicate with customers, it will retain customers and reduce new customer development costs for the enterprises.

Table 5. Analysis on correlation coefficients in various dimensions of green consumption.

Variable	Refuse to use non-green products	Reduce the use of non-green products	Choose reusable products	Choose recyclable products
Refuse to use non-green products	1.000			
Reduce the use of non-green products	0.556**	1.000		
Choose reusable products	0.610**	0.750**	1.000	
Choose recyclable products	0.547**	0.774**	0.879**	1.000

**Means when significance level is 0.01 (two-tailed), it is significant correlation.

Table 6. Analysis on correlation coefficients in various dimensions of green supply chain.

Variable	Environmental public record	Implement hazardous waste management	Pass the ISO 14000 certification	Implement environment-friendly packaging	Implement the management of hazardous air pollution emissions
Environmental public record	1.000				
Implement hazardous waste management	0.904**	1.000			
Pass the ISO 14000 certification	0.599**	0.570**	1.000		
Implement environment-friendly packaging	0.705**	0.725**	0.848**	1.000	
Implement the management of hazardous air pollution emissions	0.778**	0.800**	0.663**	0.818**	1.000

**Means when significance level is 0.01 (two-tailed), it is significant correlation.

Table 7. Analysis on correlation coefficients in various dimensions of green product marketing.

Variable	Brand extension strategy	Enterprise's operating performance	Enterprise's economic value-added	Brand management capacity
Brand extension strategy	1.000			
Enterprise's operating performance	0.653**	1.000		
Enterprise's economic value-added	0.777**	0.791**	1.000	
Brand management capacity	0.741**	0.653**	0.905**	1.000

** Means when significance level is 0.01 (two-tailed), it is significant correlation.

Customer loyalty of green product

Table 9 shows the correlation analysis results from the respondents on the customer loyalty of green products, from the table it can be found that: re-purchase intention has significant correlations with purchase the company's other products or services, price tolerance and recommend to others, correlation coefficients are all above 0.7,

Table 8. Analysis on correlation coefficients in various dimensions of green product customer development.

Variable	Customer share	Customer retention and development	Frequency of repeat purchase	Willing to communicate with customers
Customer share	1.000			
Customer retention and development	0.848**	1.000		
Frequency of repeat purchase	0.769**	0.672**	1.000	
Willing to communicate with customers	0.730**	0.716**	0.741**	1.000

**Means when significance level is 0.01 (two-tailed), it is significant correlation.

Table 9. Analysis on correlation coefficients in various dimensions of green product customer loyalty.

Variable	Re-purchase intention	Repeat purchase intention	Purchase the company's other products or services	Price tolerance	Recommend to others
Re-purchase intention	1.000				
Repeat purchase intention	0.927**	1.000			
Purchase the company's other products or services	0.698**	0.751**	1.000		
Price tolerance	0.808**	0.777**	0.505**	1.000	
Recommend to others	0.718**	0.705**	0.657**	0.644**	1.000

** Means when significance level is 0.01 (two-tailed), it is significant correlation.

high correlations; customer's re-purchase intention and repeat purchase intention have a significant correlation, the coefficient is 0.927, indicating a high correlation, it means customer loyalty will affect the re-purchase and repeat purchase of the services or the products.

Conclusions

With the evolution of international environmental protection trend, the concept that crisis prevention is heavier than crisis control is growing. Environmental protection is attached importance by all countries in the world; green issues will become increasingly important. This study assessed crisis factors in green marketing for Hotai Motor, the green marketing process was divided into five major dimensions: green consumption, green supply chain, the marketing, customer development and customer loyalty of green products; on the whole, respondents first focused on the green consumption, the average was 3.87, whereas the lowest was the green supply chain with its average of 3.62. Based on analysis results, in the

marketing of Hotai Motor, the implicit crisis factors of green consumption include rejection and reduction of the use of non-green products, choosing reusable and recycled products, which is highly correlated and very important for the development of Hotai Motor.

Currently, Hotai have adopted a lot of recyclable plastics in manufacturing, in the product Life Cycle Assessment, not only reduce CO_2 emissions significantly, but Dismantling Labeling is also used to recover and dismantle vehicle structure. Inside and outside vehicles, the Toyota super olefin polymerization (TSOP) is used, which is thermoplastic plastic material. In order to response to the safety and environmental regulations, as well as demands from green production and consumption proposed by international organizations, Hotai Motor has many advanced technology and experience on material recycling and application in response to future global green consumption trends. In response to green production, 3R (Recycle, Reuse, Reduce) policy has been actively promoted, reduction of lead-containing products or using lead-free materials and a series of green behaviors have been carried out, which are useful to promote

Hotai Motor toward green business, and the results of this study may predict future marketing crisis, provide prevention and detection, as well as solutions in advance for Hotai Motor.

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