

## **An Empirical Study of Customer Relationship Management Implementation in Taiwan's Machine Industry**

Yi-Chan Chung, Department of IE & M, Ta-Hwa Institute of Technology, Taiwan, [kent4321@ms19.hinet.net](mailto:kent4321@ms19.hinet.net)  
Shiau-Wen Tien, Graduate Institute of Management of Technology, Chung-Hua University, Taiwan, [swt@chu.edu.tw](mailto:swt@chu.edu.tw)  
Chih-Hung Tsai, Department of IE & M, Ta-Hwa Institute of Technology, Taiwan, [letch@thit.edu.tw](mailto:letch@thit.edu.tw)  
Lin-Lin Tang, Graduate Institute of Management of Technology, Chung-Hua University, Taiwan, [swt@chu.edu.tw](mailto:swt@chu.edu.tw)

### **Abstract**

The competition between enterprises is becoming more intense in the 21<sup>st</sup> century. Economy is depressed, the industrial structure is changing, and unemployment is at a record rate in Taiwan. Under these competitive pressures, it is important to impress and improve the relationship with the customer. Because of the power of information and telecommunications technologies, business can track their customers and determine what they really want and how they actually use the product. Analyzing the information returned from customers and products, business can provide active and accurate service to the right customer through the right channel at the right time and increase customer satisfaction. This paper refers the Customer Service in Customer Relationship Management (CRM) and Information Technology (IT) concepts to analyze and understand the customers' needs and realize the competencies of support groups within the enterprise. The customers can therefore be better served and the efficiency and effectiveness of internal company support groups can be improved. The knowledge and experience not accumulated can be solved and the cost of manpower and services reduced.

**Keywords:** Customer Relationship Management, Information Technology, Customer Service

### **Introduction**

This study focuses on an integrated Customer Relationship Management (CRM) structure to understand the implications and application of business alternatives using a questionnaire with CRM integration on the machine industry in Taiwan. We will study business CRM implementation using "Marketing Strategy Management", "Customer Value Analysis", "Customer Relationship Management", and "Information Technology Application". This study's goals are: (1) Analyzes the key factors of CRM success from scholars and the positive CRM implementation effects to construct a CRM model; (2) Compares the differences between business scale and CRM implementation; (3) Compares the differences between business location and CRM implementation; (4) Determines key CRM success factors and related principles to provide a reference for the machine industry with a defined CRM model.

### **Literature review**

#### ***A brief history of Customer Relationship Management***

Beginning in the early 1980's, in the United States Customer Relationship Management (CRM) was called Contact Management. Information was collected from customers and companies. In the early 1990's, call centers were generated and the customer service information analysis function was performed through data warehouse, data mining, and others technologies. Now, Web-enabled Call Centers are used to enlarge the market and determine customer initiated value-added services (ARC, 1999). Recently, CRM has become a popular issue and thus the enterprises focus their attention on the customers and the customers' consuming patterns. The customers' satisfaction after consumption also becomes more significant. Wu (2000) believed that after enterprise introduces CRM, the capacity to react to the market will enormously increase. For enterprises, the main competition advantages brought along are the following three: (1) upgrading loyalty; (2) increasing business volume; (3) trimming the costs. Chen (2000) believed that CRM can bring many benefits for enterprises and the main items are as follows: (1) increasing profits; (2) increasing profit rate; (3) reducing costs; (4) upgrading concentration of the market; (5) reducing cycle times of implementation of new sales activities; (6) increasing times of small-sized target marketing; (7) increasing knowledge.

#### ***Definition of the concept of CRM***

CRM is a major issue considerably valued by business circle. It is mainly related to the basic condition of the survival of an enterprise and it can maintain good relationship with customers and allows the enterprise to be more competitive. As to the definition of CRM, in early times, there are many domestic and foreign scholars proposing

the definitions which are reorganized in Table 1.

Table 1: Definition of CRM

Scholars	Definitions
Wayland & Cole (1997)	"Customer relationship management" includes sharing four elements: customer combination management, value positioning, additional-value role and reward & sharing which determine "customer value".
Kalakota & Robinson (1999)	"CRM" means to allow all of the departments and employees to work for satisfying all of the customers' demands. CRM is a set of system which integrates sales, marketing and after-sale service.
Wu (2000)	CRM can function as the communication model among enterprise, customer and supplier under the coordination based on internet.
Rogers & Peppers (2001)	Definition of CRM: establishing relationship with customers in individualized media and delivering the data collected to different people that allow the customers and companies to have mutual benefits through transaction as long as the customers can contribute their data to reward the individualized service designed particularly for their demands.
Tiwana (2001)	From different perspectives, the enterprise understands and segments customers in order to develop a kind of combination model of enterprise procedure and information technology suitable for customized Product / Service which aims to manage the relationship with old customers and allows them to reach the highest level of loyalty, continuity rate and benefit contribution and efficiently selects and attracts new customers.
Lyu et al. (2001)	In order to win new customers and stabilize original customer relationship and increase customer benefit contribution, the enterprise constantly communicates with customers and affects customers' behavior.

### **The integrated structure of CRM**

Kalakota and Robinson (1999) considered that the appropriate CRM structure could be realized through three aspects: taking customers from other firms, buying customer from other firms, and maintaining the current customer base. Different management functions are needed to achieve the integrated CRM structure. By developing relationships between the business and customers, CRM could be separated into taking customers, buying customers, serving customers, and customer analysis. Business could use customer profiles effectively to provide real-time, excellent customer service. This is a beginning in developing the next customer through analyzing the customer's needs. To realize the four core relations at the center, CRM makes cycling the customer relation process through customer development and data feedback. It is the final target to make customer satisfied and creating profits in different functional collocation of customer relation. However, we can establish an integrated CRM structure involving three topics: Core Relations, Customer Relations, and Information Technology, by centralizing customer analysis (Taung, 2000).

### **Definition of relationship marketing**

According to different scholars' definitions of relationship marketing in different times, the researcher reorganized them as Table 2.

Table 2: Summary of definitions of relationship marketing

Scholars	Definitions of marketing relationship marketing
Rapp & Collins (1990)	Relationship marketing is a method which can closely integrate marketing, quality of customer service and maintenance of customers. It is a kind of commitment with high touch and overall quality marketing orientation.
Evans & Laskin (1994)	Relationship marketing is a kind of customer-centralized method. The enterprise can use it to establish long-term business relationship with future and current customers.
Perrien & Richard (1995)	It is a kind of unequal and individualized marketing process which is persistent due to in-depth understanding toward customers' demands and characteristics. Two parties' sharing belief is also formed.
Kolter (1997)	Establishing long-term and satisfying relationship with important targets such as customers, suppliers and distributors in order to maintain two parties' fixed cooperation and business relationship.
Christy et al. (1996)	Based on voluntary and mutually beneficial behavior, two parties of buyers and sellers establish a kind of formal transactional behavior which increases the possibilities of future transaction.
Wang & Mowen (1997)	Relationship marketing is for mutual interests and benefits as well as cultivating and maintaining long-term relationship in organizational and persistent way.
Williams et al. (1998)	Through the implementation of customer-oriented strategy to obtain long-term customers' satisfaction and additional value of sales.

Thus, this research defines relationship marketing as that in order to establish, develop and strengthen long-term relationship with customers, the enterprise accomplishes long-term and mutually beneficial relationship through offering customers individualized service. As the time trend evolving and consumer conscious raising, the traditional marketing theory will develop. Kotler (1997) considers that the theory of marketing management is generated by five different operating principles: (1) production concept; (2) product concept; (3) sales concept; (4) marketing concept, and (5) social market concept. He also considered that the different levels of customer relationship will separate relationship marketing into: (1) basic marketing, (2) reactive marketing, (3) accountable marketing, (4) proactive marketing, and (5) partnership marketing. However, under marketing theory development, the traditional sales principles are not suited to the market of today. In business, the important task is how to use relationship marketing with integrated marketing effectively to strive for customer loyalty. Integrated marketing has progressively formed this concept.

### ***Value compass***

The value compass determines the value of four customer relationship perspectives was brought out by (Chaio, 2000). It is the strategy the best value of collaboration between business and business through correct connection (see Figure 1). We will introduce the four perspectives that the value compass decides the value of customer relationship as follows.

### ***Customer portfolio management***

Customer portfolio management means that how to choice the valuable customer relationship and management principles. It can be separated into three items: (1) Market level. Business makes the portfolio target as all customers in the wide market. The best purchasing-power customer is the best valuable customer. (2) Group level. The object is certainty distinguish or different type group customers. They could give the supplier rich feedback. Managers provide service which satisfies customers' special needs. (3) Individual level. Business has to know deeper customer knowledge and adopt individual management when the needs are very different in relation value, preference, and individual needs.

### ***The setup of value position***

The value position is meaning that the value exchange degree between buyer and seller. Business will provide much service in the value chain or total experience for the customer to increase the value of the customer relationship. This can be separated into three items: (1) Core product. It can be defined clearly as the special part of customer value chain. Supplier can improve core product or service to reduce the cost of customer; (2) Extended service. Increase more related buyers' value chain or total experience. This means that sellers could provide much service for customer to achieve the customers' needs; (3) Total resolution alternative. It is wider value position that sellers will intervene in buyers who satisfied or achieved targets to adopt activities including the interrelation and communication channel between them.

### ***Value-added role***

Value-added role is how business seeks out obtaining the best profit feedback position between customer and suppliers in related value chain. It can be separated into three roles: (1) Product manager. This is a series of interrelated activities and business behaviors that provide a product to buyers; (2) Process manager. It is a multi-perspective connected model between a customer and supplier. The process manager customer relationship involves all position in value position, but it refers to the wider value exchange; (3) Network manager. It involves multi-perspective between buyers and sellers and the connection of related groups.

### ***Reward and risk sharing***

The interactive between customers and suppliers is basic on value creating and value sharing. There are three different represented positions as follows: (1) Market-base sharing. It is the basic model of the reward and risk sharing. This was decided by the market and possessed neutral characteristic. (2) Expression-base sharing. In the future, it will hold and operate the price of some products that are risk-taking and uncertainty. They usually determine the risk by negotiation to develop the extend relationship. Quality assurance and after-selling service is common model of risk-taking. (3) Result-base sharing. It is partnering all most people mean joint risk-taking. However, the sharing reward is based on the degree of plan success.

### ***Customer service management***

There are three customer service parts including construct service system, after-sales service, and satisfaction investigation. The services provided involve before-sales, sale, and after-sale. As business can provide perfect selling process in spot, they can keep the customer to increase opportunity of profit. However, all kinds of follow-up service, it can not only strive customer loyalty and compensate for customer dissatisfied but also stop negative product information from spreading. At the same time, as better understanding of what satisfies the customer, the business learns to provide improved products and services.

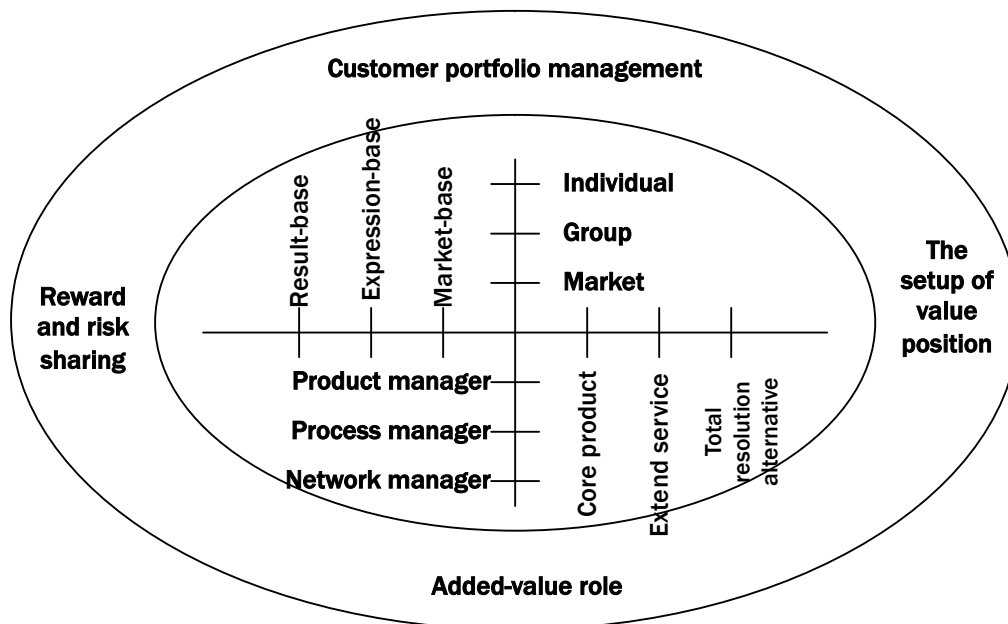


Figure 1: Value compass

### **Service system construction**

Rohit (1996) considers that when a business builds a service system, a service design and service delivery process are involved. (1) Service design: Considers the product characteristics suitable for different services. (2) Service delivery: Considers the environment in which the service is provided, and a whole set of alternatives to ensure that service quality is achieved between the salesman and customer. Until now, most business has established a specific customer service department to handle customer related services. The administration in charge of design and controlling customer service, planning and executing all kinds of sales services occur on the spot. It, the call center or service center, will help the business deliver customer service.

### **After-sales service management**

After-sales service is all kinds of services asked for after the sale is completed. This is separated into extended service satisfaction, confirmation management and after-sales service. Business takes the initiative for completed consumer to confirm the product use condition and satisfaction. In the execution of after-sales services, how much resources the business input is divided into four items: (1) product questionnaire feedback; (2) acknowledgement letter delivery; (3) telephone interviewing; (4) sales interview. An example of the general customer call process, business should obey the following principles to increase customer satisfaction: (1) Calm down the customer's feelings; (2) List the emergency; (3) Express concern; (4) Afford redress; (5) Conduct a follow-up investigation.

### **Customer satisfaction investigation**

A complete customer satisfaction investigation should have overall planning to raise the validity and reliability in investigation result. The identification and supporting of senior manager will affect the result. Only senior manager support should set the investigated target to achieve customer satisfaction through developing research, analysis, and result application. We can separate the complete customer satisfaction investigation process into eight items as follows: (1) senior manager support; (2) investigation target identification; (3) investigation plan; (4) questionnaire list; (5) questionnaire execution; (6) questionnaire result analysis; (7) information sharing; (8) investigation review.

### **Information technology construction**

Information technology infrastructure and construction could provide the needed competitive information technology resources. They are also the key factors of forming basic strength difference. Davidow & Malone (1992) considered that when information technology infrastructure and construction could allow new business strategies to appear and provide integrated connectivity mechanisms (Broadbent *et al.*, 1999). Applegate *et al.* (1999) considered a broad definition of information technology that included information technology infrastructure and information technology related operation and opportunity. However, Ken (1996) considered that information technology construction could provide an overview of business owned information technology, possible technology, and implies business operation. This connects organization structure and business strategy. Information technology infrastructure is an information technology capability to help business information integration and sharing. Weill (1993) considered that the information technology capacity of technology infrastructure possesses not only information technology, but also technology perspectives that provide basic operation levels, communication,

software equipment, network systems and management perspectives. Furthermore, Broadbent *et al.* (1999) consider that information technology capacity should also involve the scope of reach and range in business; the scope of reach is connection level of information technology capacity and the range of reach is provided service of information technology capacity.

**Methodology**

**The structure of CRM**

This study focuses on the cognition and application of CRM in the machine industry in Taiwan. We analyzed the difference between Marketing Strategy Management (MSM), Customer Value Analysis (CVA), Customer Service Management (CSM), and Information Technology Application (ITA) with different characteristics (see Figure 2).

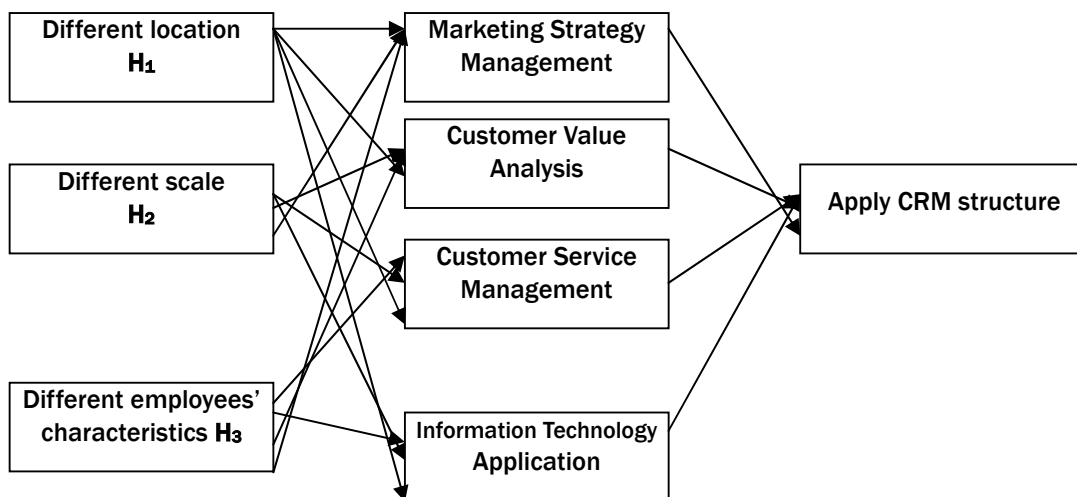


Figure 2: Research structure

**Hypotheses**

The hypotheses developed in this work are shown in Table 3.

Table 3: Hypotheses

Hypotheses	
<b>H<sub>1</sub></b>	<b>The difference in different location to MSM, CVA, CSM, and ITA.</b>
H <sub>1a</sub>	There is no significant difference in location to Marketing Strategy Management (MSM).
H <sub>1b</sub>	There is no significant difference in location to Customer Value Analysis (CVA).
H <sub>1c</sub>	There is no significant difference in location to Customer Service Management (CSM).
H <sub>1d</sub>	There is no significant difference in location to Information Technology Application (ITA).
<b>H<sub>2</sub></b>	<b>The difference in different scale to MSM, CVA, CSM, and ITA.</b>
H <sub>2a</sub>	There is no significant difference in scale to Marketing Strategy Management (MSM).
H <sub>2b</sub>	There is no significant difference in scale to Customer Value Analysis (CVA).
H <sub>2c</sub>	There is no significant difference in scale to Customer Service Management (CSM).
H <sub>2d</sub>	There is no significant difference in scale to Information Technology Application (ITA).
<b>H<sub>3</sub></b>	<b>The difference in employee characteristics to MSM, CVA, CSM, and ITA.</b>
H <sub>3a</sub>	There is no significant difference in employee characteristics to Marketing Strategy Management (MSM).
H <sub>3b</sub>	There is no significant difference in employee characteristics to Customer Value Analysis (CVA).
H <sub>3c</sub>	There is no significant difference in employee characteristics to Customer Service Management (CSM).
H <sub>3d</sub>	There is no significant difference in employee characteristics to Information Technology Application (ITA).

**Variable description**

The structure is combined with Marketing Strategy Management, Customer Value Analysis, Customer Service Management, and Information Technology Application in CRM. The variables are described in Table 4.

Table 4: The variables in CRM structure

Variables	Item
Marketing Strategy Management	1. Business make customers become partner to participate the value interchange.
	2. Carry out marketing strategy with 4P principles.
	3. Each department should pursue for improving service process continuously.
	4. Business should set the marketing performance assessment principles to be total marketing.
	5. Take customer profile to design sales activities.
	6. Take automatic technology assistant tools to design sales activities.
Customer Value Analysis	1. Lead in data warehousing to setup and analyze customer profile.
	2. Adopt data mining to analyze consumer behavior.
	3. Establish specific department to analyze customer profile.
	4. Adopt customer value analysis to identify target customers.
Customer Service Management	1. It is urgent task to make quick service system as well.
	2. Improve quality initiatively to satisfy customer as well.
	3. Analyze customer respond question as well to improve service quality.
	4. After owning perfect internal customer, business will have satisfied external customer.
	5. Business should make investigation of customer satisfaction and apply it.
	6. There is a rise trend of customer satisfaction by implementing CRM.
Information Technology Application	1. Business and customer interchange continuously by operating information.
	2. The database is the CRM base.
	3. Make the best profit by applying customer database to provide marketing service.
	4. As customer profiles do not be integrated, the utilization ratio of them falls.
	5. Lead in the supporting technology which CRM need.
	6. Adopt Internet and others related tools to provide convenient customer service.

This study adopted descriptive statistics, reliability analysis, t-test, One-way Analysis of Variance (ANOVA) by SPSS for Windows 10.0 to analyze the machine industry in Taiwan.

## Analysis and Result

### *The questionnaire sample structural analysis*

We emitted 640 questionnaires and recovered 194 in 2006. The total recovery ratio was 30.31%. Sixty-eight of the 194 returned questionnaires were invalid, making the valid recovery ratio 19.69%. This study was directed at business proprietors and unit leaders. The proprietors occupied 29.37%, senior managers occupied 48.41%, and the middle managers occupied 22.22%. The sample showed that the average business experience was 11~15 years occupied 53.18%, above 16 years occupied 26.98%. The education levels for this sample were above college occupied 93.65%. In sum, the sample had be representative to realize the questionnaire meaning when they answered. The reliability was tested by the Cronbach's  $\alpha$  value to each perspective (See Table 5). All perspectives reliability represent high reliable with total questionnaire Cronbach's  $\alpha$  value is 0.8446 (above 0.7). The Customer Value Analysis perspective (Cronbach's  $\alpha = 0.7989$ ) and Customer Service Management perspective (Cronbach's  $\alpha = 0.7908$ ).

Table 5: Reliability analysis

Perspectives	# of questions	Cronbach's $\alpha$
CRM overview	8	0.7285
Marketing Strategy Management	6	0.7998
Customer Value Analysis	4	0.7989
Customer Service Management	6	0.7908
Information Technology Application	6	0.7277
<b>Total</b>	<b>30</b>	<b>0.8446</b>

### *The analysis of difference in different location to CRM overview*

This paper studied the different location relation to CRM first. There was a more positive view in "We will have clear CRM direction and target in the future" and "We should established specific department to maintain and improve customer relation" with Central Taiwan area businesses than Northern and Southern area businesses. There was more positive view in "There is a rise-trend of total satisfaction with customer" with the central area businesses than northern and southern area businesses. For this reason, lots of resources are available in Central Taiwan. This

fuels machine industry development in the central area.

**The analysis of difference in different location to MSM, CVA, CSM, and ITA.**

This study used One-way ANOVA to test the significant difference in different location to MSM, CVA, CSM, and ITA (See Table 6). We find that there is not any F-value significant in different location to MSM and CVA perspectives and the entire Mean is above 4. The opinions of sample in MSM and CVA perspectives are the same. We support the H<sub>1a</sub> and H<sub>1b</sub>. In the CSM perspective, there is not also any F-value significant in different location to this one, but only on “After owning perfect internal customer, business will have satisfied external customer” and “Business should investigate customer satisfaction and apply it” the mean between 3.3 and 4.0, the others are above 4. The opinions of sample in CSM perspective are the same. We support the H<sub>1c</sub>. Finally in the ITA perspective, there is only “Adopt Internet and others related tools to provide convenient customer service” the F-value shows significant (P= 0.005) in different location to this one. The others are not significant and the entire Mean is above 4. Most sample opinions in this perspective were the same. We support the H<sub>1d</sub>.

Table 6: Statistic Analysis

	Items	Mean	Standard error	F	Significant
Marketing Strategy Management	Carry out marketing strategy with 4P principles.	4.51	0.54	0.51	0.951
	Each department should pursue for improving service process continuously	4.04	0.70	0.523	0.594
	Business should set the marketing performance assessment principles to be total marketing.	4.17	0.64	0.133	0.875
	Business make customers become partner to participate the value interchange.	4.13	0.85	1.070	0.346
	Take automatic technology assistant tools to design sales activities.	4.16	0.63	0.295	0.745
	Take customer profile to design sales activities.	4.27	0.55	0.008	0.992
Customer Value Analysis	Adopt data mining to analyze consumer behavior.	4.43	0.53	0.290	0.749
	Lead in data warehousing to setup and analyze customer profile.	4.12	0.69	0.716	0.491
	Establish specific department to analyze customer profile.	4.26	0.67	0.979	0.379
	Adopt customer value analysis to identify target customers.	4.31	0.58	1.256	0.289
Customer Service Management	It is urgent task to make quick service system as well.	4.30	0.58	0.038	0.963
	Improve quality initiatively to satisfy customers.	4.33	0.80	0.743	0.478
	After owning perfect internal customer, business will have satisfied external customer.	3.34	0.91	1.167	0.315
	Business should make investigation of customer satisfaction and apply it.	3.93	0.64	0.472	0.625
	There is a rise trend of customer satisfaction by implementing CRM.	4.27	0.64	0.244	0.784
	Analyze customer respond question as well to improve service quality.	4.30	0.55	0.043	0.958
Information Technology Management	Database is the base of building CRM.	4.41	0.53	0.408	0.666
	Business and customer interchange continuously by operating information.	4.42	0.51	0.878	0.419
	As customer profiles do not be integrated, the utilization ratio of them falls.	4.41	0.56	0.757	0.471
	Adopt Internet and others related tools to provide convenient customer service.	4.51	0.52	5.505	0.005**
	Lead in the supporting technology which CRM need.	4.31	0.74	0.914	0.404
	Make the best profit by applying customer database to provide marketing service.	4.06	0.42	0.939	0.394

Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

**The difference in capital to CRM analysis**

This study found a more positive view for “It could solve most customers’ questions by implementing CRM” with above 80 million (NTD) capital businesses than the capital between 5 million to 80 million businesses, and for “We should established specific department to maintain and improve customer relation” and “There is a rise-trend of total satisfaction with customer”. There was a more positive view for businesses above 20 million capitals than those with capital between 5 million to 20 million. This shows that there are more implement and effectiveness in CRM practical application with higher capital businesses than lower ones.

**The analysis of difference in different scale to MSM, CVA, CSM, and ITA**

This study used One-way ANOVA to test the significant difference in scale to MSM, CVA, CSM, and ITA. We find that there is not any F-value significant in different scale to MSM and ITA perspectives and the entire Mean is above 4. The sample opinions for MSM and ITA perspectives were the same. We support the H<sub>2a</sub> and H<sub>2d</sub>. In the CVM perspective, there is only “Adopt data mining to analyze consumer behavior” the F-value shows significant (P= 0.003) in different scale to this one. The others were not significantly different and the entire Mean was above 4. Most sample opinions in this perspective were the same. We support H<sub>2b</sub>. In the CSM perspective, no significant F-value was found for different scale to this one, but only on “After owning perfect internal customer, business will have satisfied external customer” and “Business should make investigation of customer satisfaction and apply it” the mean between 3.34 to 4.0, the others are above 4.27. The sample opinions for the CSM perspective were the same. We support H<sub>2c</sub>.

**The different MSM, CVA, CSM, and ITA profile analysis**

**Position**

We found a significant difference (P< 0.05) in “Take customer profile to design sales activities” with the proprietors than for middle managers after LSD analysis in MSM perspective. The reason is proprietors were more positive about developing sales and market by taking customer profile (See Table 7). And the same opinions are in CVA and CSM perspectives. However, there is significant (P= 0.010) in “As customer profiles do not be integrated, the utilization ratio of them falls” with proprietors and senior managers than middle managers. The reason for position above senior managers stress on customer profiles. If there is no integrated system about customer profile, it is loss to company.

Table 7: One-way ANOVA of different position

Item		Proprietor	Senior manager	Middle manager	Supervisory manager	Employee	F	P	LSD
Marketing Strategy Management	Carry out marketing strategy with 4P principles.	4.41	4.53	4.59			0.920	0.402	
	Each department should pursue for improving service process continuously	3.97	3.98	4.26			1.688	0.190	
	Business should set the marketing performance assessment principles to be total marketing.	4.03	4.15	4.41			2.838	0.062	
	Business make customers become partner to participate the value interchange.	3.85	4.24	4.26			2.622	0.077	
	Take automatic technology assistant tools to design sales activities.	4.03	4.13	4.41			2.967	0.055	
	Take customer profile to design sales activities.	4.15	4.22	4.52			4.062	0.020*	1 > 3
Customer Value Analysis	Adopt data mining to analyze consumer behavior.	4.32	4.44	4.56			1.452	0.238	
	Lead in data warehousing to setup and analyze customer profile.	4.03	4.18	4.11			0.516	0.598	
	Establish specific department to analyze customer profile.	4.15	4.31	4.30			0.658	0.520	
	Adopt customer value analysis to find out target customer to promote fully.	4.24	4.31	4.41			0.656	0.521	
Customer Service Management	It is urgent task to make quick service system as well.	4.32	4.20	4.48			2.227	0.113	
	Improve quality initiatively to satisfy customer as well.	4.15	4.45	4.30			1.596	0.207	
	After owning perfect internal customer, business will have satisfied external customer.	3.29	3.29	3.52			0.644	0.527	
	Business should make investigation of customer satisfaction and apply it.	3.94	3.85	4.07			1.065	0.348	
	There is a rise trend of customer satisfaction by implementing CRM.	4.29	4.16	4.44			1.826	0.255	
	Analyze customer respond question as well to improve service quality.	4.41	4.22	4.33			1.382	0.255	
Information Technology Management	Database is the base of building CRM.	4.29	4.42	4.56			1.872	0.159	
	Business and customer interchange continuously by operating information.	4.35	4.38	5.59			2.001	0.140	
	As customer profiles are not integrated, the utilization ratio of them falls.	4.24	4.40	4.67			4.783	0.010*	1 > 3 2 > 3
	Adopt Internet and others related tools to provide convenient customer service.	4.35	4.53	4.67			2.909	0.059	
	Lead in the supporting technology which CRM need.	4.18	4.25	4.59			2.765	0.607	
	Make the best profit by applying customer database to provide marketing service.	4.12	4.05	4.00			0.558	0.557	

Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

### Seniority

In Table 8, we find that all samples expressed the same opinion on seniority to MSM, CVA, and ITA perspectives. Only in CSM perspective, there is a significant ( $P < 0.05$ ) in “There was an increased trend toward customer satisfaction by implementing CRM” with the seniority of 11~20 years than 6~10 years after LSD analysis. The reason is most senior employees have higher position, they realize the important factors of the customers are the mother of business.

Table 8: One-way ANOVA of different seniority

Item		Under 5 years	6~10 years	11~15 years	16~20 years	Above 20 years	F	P	LSD
Marketing Strategy Management	Carry out marketing strategy with 4P principles.		4.38	4.57	4.47		1.107	0.334	
	Each department should pursue for improving service process continuously		3.95	4.05	4.10		0.270	0.763	
	Business should set the marketing performance assessment principles to be total marketing.		4.05	4.20	4.20		0.489	0.615	
	Business make customers become partner to participate the value interchange.		3.90	4.09	4.37		1.999	0.140	
	Take automatic technology assistant tools to design sales activities.		4.10	4.18	4.17		0.157	0.855	
	Take customer profile to design sales activities.		4.19	4.28	4.30		0.265	0.768	
Customer Value Analysis	Adopt data mining to analyze consumer behavior.		4.24	4.46	4.50		1.769	0.175	
	Lead in data warehousing to setup and analyze customer profile.		4.05	4.12	4.17		0.184	0.833	
	Establish specific department to analyze customer profile.		4.14	4.26	4.33		0.490	0.614	
	Adopt customer value analysis to find out target customer to promote fully.		4.24	4.32	4.33		0.199	0.820	
Customer Service Management	It is urgent task to make quick service system as well.		4.19	4.38	4.20		1.535	0.220	
	Improve quality initiatively to satisfy customer as well.		4.52	4.32	4.20		1.015	0.366	
	After owning perfect internal customer, business will have satisfied external customer.		3.43	3.31	3.37		0.151	0.860	
	Business should make investigation of customer satisfaction and apply it.		3.76	3.97	3.97		0.887	0.415	
	There is an increased trend toward customer satisfaction by implementing CRM.		3.90	4.35	4.33		4.404	0.014*	3 > 2 4 > 2
	Analyze customer respond question as well to improve service quality.		4.14	4.29	4.43		1.786	0.172	
Information Technology Management	Database is the base of building CRM.		4.33	4.46	4.37		0.623	0.538	
	Business and customer interchange continuously by operating information.		4.19	4.48	4.47		2.699	0.072	
	As customer profiles are not integrated, the utilization ratio of them falls.		4.38	4.40	4.47		0.186	0.830	
	Adopt Internet and others related tools to provide convenient customer service.		4.28	4.54	4.53		0.772	0.464	
	Lead in the supporting technology which CRM need.		4.14	4.29	4.47		1.234	0.295	
	Make the best profit by applying customer database to provide marketing service.		4.19	4.00	4.10		1.812	0.168	

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

### Education

This study did not find any difference in education to MSM, CVA, CSM, and ITA perspectives (See Table 9). All samples expressed the same opinions.

Table 9: One-way ANOVA of different education

Item		Senior High School	Institute	College	Master	PhD.	F	P	LSD
Marketing Strategy Management	Carry out marketing strategy with 4P principles.	4.60	4.50	4.53	4.00		0.675	0.569	
	Each department should pursue for improving service process continuously	4.20	4.05	4.04	3.50		0.478	0.698	
	Business should set the marketing performance assessment principles to be total marketing.	4.40	4.19	4.14	4.00		0.323	0.809	
	Business make customers become partner to participate the value interchange.	4.40	4.17	4.06	4.00		0.345	0.793	
	Take automatic technology assistant tools to design sales activities.	4.20	4.16	4.16	4.50		0.196	0.899	
	Take customer profile to design sales activities.	4.20	4.26	4.27	4.50		0.149	0.930	
Customer Value Analysis	Adopt data mining to analyze consumer behavior.	4.20	4.48	4.39	4.50		0.595	0.620	
	Lead in data warehousing to setup and analyze customer profile.	3.60	4.02	4.27	4.50		2.549	0.590	
	Establish specific department to analyze customer profile.	4.20	4.28	4.25	4.00		0.121	0.948	
	Adopt customer value analysis to find out target customer to promote fully.	4.40	4.40	4.22	4.00		1.110	0.348	
Customer Service Management	It is urgent task to make quick service system as well.	4.00	4.31	4.31	4.50		0.537	0.658	
	Improve quality initiatively to satisfy customer as well.	4.40	4.26	4.41	4.00		0.451	0.717	
	After owning perfect internal customer, business will have satisfied external customer.	3.40	3.29	3.43	2.50		0.801	0.496	
	Business should make investigation of customer satisfaction and apply it.	3.80	3.98	3.90	3.50		0.523	0.667	
	There is a rise trend of customer satisfaction by implementing CRM.	4.00	4.29	4.27	4.00		0.438	0.726	
	Analyze customer respond question as well to improve service quality.	4.40	4.26	4.31	5.00		1.276	0.286	
Information Technology Management	Database is the base of building CRM.	4.00	4.41	4.45	4.50		1.127	0.341	
	Business and customer interchange continuously by operating information.	4.00	4.41	4.47	4.50		1.310	0.275	
	As customer profiles do not be integrated, the utilization ratio of them falls.	4.00	4.48	4.37	4.50		1.319	0.272	
	Adopt Internet and others related tools to provide convenient customer service.	4.00	4.53	4.53	4.50		1.706	0.170	
	Lead in the supporting technology which CRM need.	4.40	4.38	4.22	4.50		0.509	0.677	
	Make the best profit by applying customer database to provide marketing service.	4.60	4.12	3.92	4.50		1.700	0.167	

Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

### Result

In sum of these main three hypotheses, we find that there is no difference in H<sub>1a</sub>, H<sub>1b</sub>, H<sub>1c</sub>, H<sub>2a</sub>, H<sub>2c</sub>, H<sub>2d</sub>, and H<sub>3b</sub>. However, in H<sub>1d</sub>, there is only significant difference in “Adopt Internet and others related tools to provide convenient customer service”. In H<sub>2b</sub> there a significant difference occurred only in “Adopt data mining to analyze consumer behavior”. In position perspective of H<sub>3a</sub>, there is only significant difference in “Take customer profile to design sales activities”. In seniority perspective of H<sub>3c</sub>, there is only significant difference in “There is a rise trend of customer satisfaction by implementing CRM”. Finally in position perspective of H<sub>3d</sub>, there is only significant difference in “As customer profiles do not be integrated, the utilization ratio of them falls”.

### Conclusions and recommendations

#### Conclusions

The CRM is a customer-oriented concept. Realizing that every customer needs integrated resources, promoting substantial value for the customer through channel to interact between the customer and business. This study refers to the situation and key successful factors of lead-in CRM in Taiwan's machine industry. We make conclusions as follows:

- (1) The machine industry agrees with the four perspectives- Marketing Strategy Management, Customer Value

Analysis, Customer Service Management, and Information Technology Application, are the key successful factors. Carrying out CRM reduces wasted time and effort.

(2) There were no significant differences in scale to MSM, CSM, and ITA perspectives. However, there was a significant difference in scale to CVA in "Adopt data mining to analyze consumer behavior" with big business than middle and small business.

(3) For the different culture and operation, there is a significant difference in ITA perspective "Adopt Internet and others related tools to provide convenient customer service" with northern area businesses over southern area businesses.

(4) The CRM is initiative phase with regard to machine industry. Many business do not understand the advantage of CRM, they think leading CRM need high technology and a lot of budgets.

In summary, we pointed out the CRM implementation structure clearly and think that when the machine industry applies CRM, they should enhance establishing organized CRM and senior managers should support this change.

### **Recommendations**

In the free trade and globalization trend in the world today, the machine industry increases its profits by changing to CRM gradually. We provided some recommendations as follows:

(1) We found that Taiwan's machine industry lacks data mining to analyze and integrate customer profiles. They should analyze customer profiles to develop customer value in maintaining current customers.

(2) We realized that it is worthwhile for the machine industry to apply CRM to their business knowledge management and promote service sales professional ability.

We make some recommendations for other follow-up researches as follows.

(1) Due to the difference in CRM system supplier, CRM must be defined and made consistent to compare objectively.

(2) There are a numerous effective measures when business lead-in CRM, however, it is difficult to collect information about non-financial index. Therefore, the follow-up research could focus on what kinds of effective CRM implementations and design indices are needed to measure performance.

(3) The CRM has a wide scope. Follow-up research could focus on a single topic such as data warehousing and data mining for advance.

(4) In electronic-commerce application structure, businesses have internal integrated Enterprise Resource Planning (ERP) and external Supply Chain Management (SCM) with supplier. There should be huge efficiency in CRM, ERP and SCM integration.

(5) Information technology is an unceasing progress. There could be changes in CRM development in the future. Follow-up researches could focus on CRM integration with other alternatives.

### **References**

ARC Ed., (1999), "Integrated Strategy, Technology, and process execution- eCRM," Electronic Business manager Report.

Applegate, L.M., McFarlan, F.W. and McKenney, J.L., (1999), "Corporate Information Systems Management: Text and Cases," 5<sup>th</sup> edition, McGraw-Hill.

Barney, J., (1991), "Firm resources and sustained competitive advantage," Journal of Management, Vol. 17, No. 1, pp.99-120.

Broadbent, M., Weill, P. and Neo, B.S., (1999), "Strategic context and patterns of IT infrastructure capability," Journal of Strategic Information System, Vol. 8, pp.157-187.

Chaio, C.L., (2000), translated, Robert E. Wayland and Paul M. Cole, "Customer Relationship Management," Business Weekly Press, Taiwan.

Chen, Wen-hua, (2000), "Successful Key of CRM," High-quality Customer Information, Taiwan.

Christy, R., Oliver, G, and Penn. J., (1996), "Relationship Marketing in Consumer Markets," Journal of Marketing Management, Dec, pp.175-187.

Clemons, E., Row, M. and Venkateswaran, R., (1989), "The Bell Canada CRISP project: a case study of migration of information systems infrastructure for strategic positioning," Office: Technology and People, Vol. 5, No. 4, pp.299-315.

Darnton, G., and Giacolette, S., (1992), "Information and IT Infrastructures, Information in the Enterprise: It's More Than Technology Digital Press," Salem, Ma, pp.273-294.

Davidow, W.H., and Malone, M.S., (1992), "The Virtual Corporation," New York, Harper Collins.

Evans, J.R. and Laskin, R.L., (1994), "The Relationship Marketing Process: A Conceptualization and Application," Industrial Marketing Management, Vol. 23, pp.439-452.

Kalakota, R. and Robinson, M., (1999), "e-Business: Roadmap for Success," Addison-Wesley, pp. 114-117.

Keen, P.G., (1996), "Do you need an IT Strategy?," Luftman, J. N. Eds.

Kotler, P., (1997), "Marketing Management: Analysis, Planning, Implementation, and Control," 9<sup>th</sup> ed., New Jersey, David Borkowsky.

Lyu, Chi-chung, et al., (2001), "Strategic Application of Customer Relationship Management," Quality Control Journal, Taiwan.

Perrien, J. and Ricard, L., (1995), "The Meaning of a Marketing Relationship: A Pilot Study," Industrial Marketing Management, Vol. 24, pp.37-57.

Rogers and Peppers, (2001), "The Relationship-Base Enterprise: Powering Business Success through CRM," pp.52.

Rohit, R., (1996), "Design and Management of Service Processes," 1<sup>st</sup> ed., USA, Addison Wesley.

Rapp, S. and Collins, T., (1990), "The Great Marketing Turn around," Prentice-Hall, Englewood Cliffs, NJ.

Taung, C.C., (2000), "Development situation and trend of Call Center," Information and Computer Press.

Tiwana, A., (2001), "The Essential Guide to Knowledge Management: E-Business and CRM Applications," Prentice Hall, Upper Saddle River, NJ.

Wayland, Robert E. and Paul M. Cole., (1997), "Customer Connections: New Strategies for Growth," Boston, Harvard Business School Press.

Wang, C.L. and Mowen, J.C., (1997), "AIM: A New Perspective on Relationship Marketing for Professional Services," Journal of Professional Services Marketing, Vol. 15, No. 2, pp. 55-68.

Weill, P., (1993), "The role and value of information technology infrastructure: some empirical observations," Idea Group Publishing, Middleton, PA.

Williams, J.D., Sang-Lin Han and Qualls, W.J. (1998), "A Conceptual Model and Study of Cross-Cultural Business Relationships," Journal of Business Research, Vol. 42, pp. 135-143.

Wu, Shin-ying, (2000), "Research on Enterprise's Introduction of CRM," Master's thesis of Department of Business Management, National Taipei University, Taiwan.