Chapter 5

ANALYSIS OF RESULTS

The results of the survey are analyzed and discussed in this chapter. Included in the analysis are a description of the general characteristics of the respondents who are members of the PPS teams; review of the PPS activities and a critique on the organization and management of these activities .

General Characteristics of Respondents

A total of 220 questionnaires were distributed to employees who have participated in PPS team activities in the past and currently. 195 questionnaires were returned , yielding a response rate of 88.7%

Table 1 summarizes the demographic profile of the 195 respondents. Approximately 64% of the respondents were Malay, 22% were Chinese and the rest (14%) were Indian employees of Motorola. Members between the age group of 31-40 years old made up the largest percentage (63%) of the sample, followed by the 21-30 years category (25%) and those between 41-50 years of age (12.3%)

There seemed to be a balanced between those who worked shifts (53.4%) and those on normal hours (46.6%). Almost 66% of the samples were females, while the rest were males. Majority of the respondents were married (79.5%) and the rest (20.5%) were

Table 1: General Characteristics of Respondents

General Characteristics								
Shifts	**N**	**%**	**Race**	**N**	**%**	**Category**	**N**	**%**
Yes	104	53.4	Malay	126	64.4	operator	112	57.5
No	91	46.6	Chinese	43	21.9	technician	21	11
Gender			Indian	27	13.7	supervisor	19	9.6
Female	128	65.8	Others	0	0	engineer	29	15.1
Male	67	34.2				section head	8	4.1
Marital status			**Education**			manager	5	2.7
Married	155	79.5	SRP	29	15.1			
Single	40	20.5	SPM	104	53.4	**Years of**	**Mean**	**S.Dev**
Age			STPM	6	2.7	**Service**	13.8 yrs	6.8
21-30	48	24.7	Diploma	16	8.2			
31-40	123	63	Degree	40	20.5			
41-50	24	12.3						

single. The results showed that shift or no shift working hours did not seem to prevent the teams from being actively involved, not even their marital status. A total of 67.5 % of them had form five and lower academic qualifications and another 10.9% had either form six or diploma. The remaining respondents (20.5%) consisted of graduates.

More than half (57.5%) of the respondents were production operators while the technicians made up 11% and supervisors (9.6%) . The rest of the respondents were engineers (15.1%), section heads (4.1%) and managers (2.7%). This implied the participation of all levels of employees to ensure the success of the QCC programs in this era (Nonaki. 1993). The respondents average number of years service is 13.8 years with a standard deviation of 6.8 years.

An Overview of PPS Attributes

The average number of PPS teams. which the respondents had participated in since joining the organization was three. Almost 58% of them were ordinary members, whilst some assumed the roles of leaders (15.2%), secretaries (24.2%) and treasurers (13%).

Table 2: Role of respondents in PPS

	Leader	Secretary	Treasurer	Member
N°	30	47	6	112
%	15.2	24.2	3	57.6

Table 3 summarizes the percentage of 'yes' responses on a multiple - choice question on reasons for participating in a PPS team.

Table 3 : Reasons for Participation in PPS Team

Reasons for Participation	% responses
Out of curiosity	32.5
Influenced by friends	9.1
Management decision	31.2
To learn more about PPS process and tools	49.4
To improve work relations	54.5
For self development reasons	44.2
To get exposure which could assist in promotion	35.1
Voluntarily	46.8
Others	6.5

* all figures above indicate only the percentage of 'yes ' responses

Generally most respondents joined the PPS teams to improve their work relations (55 %). About 49% said that they joined to learn more about PPS process and tools . whilst 46.8% joined voluntarily. Some 44.2% joined for self development reasons and 35.1% believed that PPS could give them the exposure which could assist in promotion. Another 32 % decided to joined out of curiosity while 31.2% participated becauses of the

management's decision. Only 9.1% of the respondents said that friends influenced them to join.

The membership size of a typical PPS team are summarized in Table 4. It was observed that on the average, members came from three different areas of operation which signifies the cross functional attribute of the PPS teams. The trend towards this is increasing as teams could not avoid depending on other functions in order to solve problems that benefit the organization as a whole (Karatsu 1988). A review of some teams of the PPS projects revealed that some teams had alerady gone cross boundaries, that is by involving a team member from other departments.

Table 4: Team Characteristics

|	
Average number of members in a team	10
Average number of different areas where members come from	3

Table 5 showed that most of the team members came from the production line (80%) and 16% were from the Quality Control Department (16%) and the rest (4%) came from other supporting departments such as the Purchasing and Training Departments. Futher investigation revealed that, other than finance, human resources departments, other support departments, namely the mold fabrication shop had shown interest in PPS activities. This confrimed the fact that the QCC concept can be applied to any other departments other thna the production area (Ishikawa, 1984).

Table 5: Departments Represented by Members

	Production	Quality Control	Purchasing	Others
N	156	31	3	5
%	80	16	1.3	2.7

The problems solved were mostly on quality improvement (31%). productivit improvement (23%) and cycle time (21%) problems as shown in Table 6. Some 19% solved problems on yield improvement and 6% solved other type of problems such a: reducing document errors. The completed projects of the PPS teams, on quality improvement problems can be broken down further into finer categories like, reducing non-value-added activities, cost savings and equipment efficiency problems, reducing headcounts, etc.

Table 6: Types of Problems Solved by PPS Teams
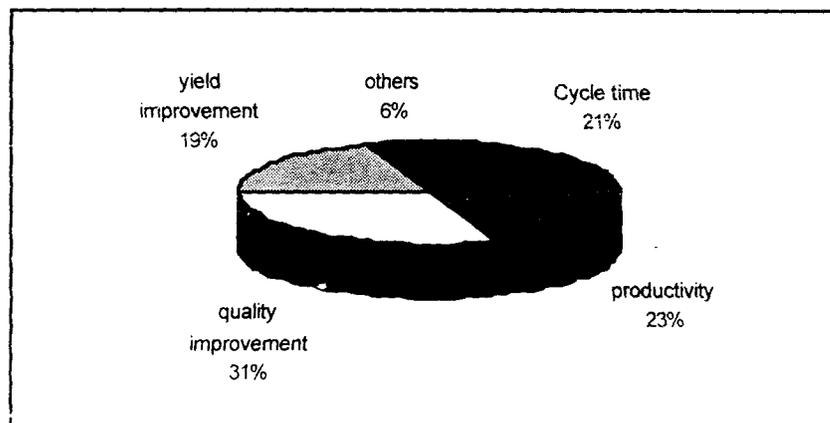
Data from Table 7 revealed that 62% of the respondents confessed that the teams were usually initiated. when they detected problems and 22.1% of them said that they acted on the instruction of the management to solve the problem. The rest indicated that they

formed teams based on customers' demand (11.8%) and some (3.9%) without a particular

problem in mind

Table 7: How Was Team Formed ?

How was the team formed	% responses
When a particular problem was found	61.8
Based on customer's demand	11.8
Without a particular problem in mind	3.9
Instructed by management	22.4

* all figures above indicate only the percentage of 'yes ' responses

The survey results in Table 8 showed that 42.7% of the respondents said that team

meetings were usually held once a week while 40% said once a fortnight (40%) 2.7%

once in three months and 12% once a month. There were 2.7% who gave other reasons

such as only when the need arises.

Table 8: Characteristics of Meetings Held by PPS Teams

	1 week once	2 weeks once	3 weeks once	1 a month	other
N	83	78	5	23	5
%	42.7	40	2.7	12	2.7

Some 80.5% of the respondents claimed that their meetings were held during working

hours and the rest (19.5%) said that they were held afterr office hours as shown in Table

9.worked after office hours . On the average the meeting lasted about 1 hour (stdev = 1.03

hrs) each.

Table 9: When Do Teams Hold Their Meetings

	During office hours	After office hours
N	157	38
%	80.5	19.5

A small majority of the respondents (53.3%) stated that the average attendance level per meeting was 71% to 90% and the rest (42.7%) said that it was more than 90%.

Table 10 : Members Attendance Level

	< 50%	51-70%	71-90%	>90%
N	0	8	104	83
%	0	4	53.3	42.7

In response to a multiple choice question on reasons for poor attendance , 70.1% of the sample believed that it was due to members being too busy while 49.4% of them blamed it on membes coming from different shifts as shown in Table 11. However 15.6% of the respondents said that it was due to the meetings being held after office hours and 11.7% of them confessed that they were not informed ahead of time. Others (14.3%) other reasons such as members being on medical and maternity leaves.

Table 11: Reasons for Low Attendance

Reasons for low attendance*	% responses
Members are too busy	70.1
Meetings not pre-arranged	11.7
Meetings are held after office hours	15.6
Members are from different shifts	49.4
Others	14.3

* all figures above indicate only the percentage of 'yes ' responses

Table 12 showed that most of the respondents (67.5%) had received training on PPS tools. presentation skills (55.8%) and application software (40.3%). About 40% of them

agreed that they had been trained in QCC philosophy and concept. human relations (36.4%), statistical techniques (33.8%) and public speaking skills (33.8%). Motorola's training policy supported this fact as every employee is required to complete a minimum of 40 hours of training in a year.

Table 12: Training Attended by Members

Training attended by members	% responses
QCC Philosophy and concept	40.3
PPS tools	67.5
Statistical techniques	33.8
Human Relations	36.4
Presentation skills	55.8
Public-speaking skills	33.8
Application software	40.3
Others	1.3

* all figures above indicate only the percentage of 'yes ' responses

Table 13 summarizes all the 'yes' responses on problems solving techniques frequently used by members. The most common ones were the Cause and Effect Diagram (89.6%), check sheets (84.4%) and pareto charts (75.3%). Other tools that the respondents used as well were the bar charts (57.1%), pie charts (49.7%), histogram (44.2%),design of experiment (42.9%) and relations diagram (28.6%). Some management teams were observed to be utilizing more complex techniques such as response surface methodology and Taguchi methods. Nevertheless, other than these basic QCC tools. there seemed to be no new tools that were used by the non-management teams.

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Table 13: Problem Solving Tools PPS Teams Used

Tools used	% responses
Check sheets	84.4
Bar charts	57.1
Pareto charts	75.3
Pie charts	49.7
Histogram	44.2
Relations diagram	28.6
Cause and effect diagram	89.6
Design of experiment	42.9
Others	0

* all figures above indicate only the percentage of 'yes ' responses

When asked on the type of problems the members of the PPS teams frequently encountered. Table 14 records the 'yes' responses to the multiple-choice question.

Table 14: Problems Encountered By Teams

Problems encountered	% responses
Ineffective interaction among members	14.3
Members lack understanding of PPS process and tools	54.5
Unequal work distribution	40.3
Ineffective leaderrship	14.3
Disinterested facilitator	18.2
No teamwork	31.2
Poor management support	23.4
Others	11.7

* all figures above indicate only the percentage of 'yes ' responses

Most of the respondents (55%) believed they lacked the understanding of the PPS process and tools (55%). This was despite the fact that 67.5% (Table 12) of them have said that they had them. Some 40% of them revealed that the unequal distribution of work was a problem while 31.2% of the respondents thought that no teamwork was a big problem among members. Another 23.4% perceived of them that poor management support, disinterested facilitators (18.2%) and ineffective leadership (14.3%) were some of the problems that they encountered, as PPS members.

In the question of whether the PPS guidebook was beneficial to the teams, 34.7% of them believed that it was very beneficial and 64% thought it was 'somewhat' beneficial, while 1.3% said that it was not beneficial at all, as indicated in Table 15.

Table 15: Opinion On The PPS Guidebook

	67	125	3
	34.7	64	1.3

About 29% of the sample perceived that (Table 16) the level of participation of members in contributing ideas during meetings was between the range between 51%-70%, 28.7% of them felt it was between 71%-90%, 22.7% said it to be moe than 90% while only 9.3% indicated it to be 9.3%.

Table 16: Level of Participation

	< 50%	51-70%	71-90%	>90%
N	18	57	56	44
%	9.3	29.3	28.7	22.7

The attendance of management personnel (Table 17) during the PPS meetings had been quite high. About 72% of the respondents reported that they had attended their meetings, while the rest responded otherwise. A high percentage (84%) of the respondents indicated that they liked the management personnel to be there at their meetings.

Table 17: Management Attendance in Teams' Meetings

a: Whether Management attend PPS meetings

	Yes	No
N	140	55
%	71.6	28.4

b: Whether , member like management o attend.

	Yes	No
	163	32
%	83.8	16.2

Most of respondents (66.2%) said that they had participated in some kind of in-house presentation of their projects, whilst the rest did not. Majority of the respondents (74%) had the opportunity to present and compete in and external competitions. These findings are summarized in Table 18.

Table 18: Participation of Teams in Internal and External Presentation.

a) Participation in In-house Management
   Presentations

	Yes	No
N	129	66
%	66.2	33.8

b) Participation in External Competitions

	Yes	No
	147	48
	74	24.7

Table 19, summarizes the level of management support as perceived by the participants.

Table 19: Perception of Respondents on Management Support

Supports and provide guidance on the implementation of PPS	9.1	29.9	51.9	5.2
Monitors the progress of teams	9.1	42.9	36.4	5.2
Encourages teams to set new goals, one a project is completed	9.1	29.9	50.6	6.5
Recognizes that PPS can develop work attitudes among workers	9.1	19.5	61	3.9
Willingness to attend to employees' problems	11.7	33.8	40.3	7.8
Recognizes workers' contribution by providing rewards	13	22.1	44.2	10.4

Majority (67 %) of respondents perceived the management's support and guidance on the

implementation of PPS as satisfactory and very satisfactory as shown in Table 19.

However. on the question of whether the management monitors the progress of teams, 43

% of the respondents said that it was less satisfactory . A personal interview with some

members to understand why these findings seemed to contradict , members responded

that although there was support in terms of guidance buthardly any management

personnel looked at the results at different stages in a timely manner. About 57.1% of the respondents were more than satisfied with the fact that the management had encouraged teams to set new goals once a project was completed. Some 65% of them were satisfied with the management in recognizing the PPS teams ability to develop positive work attitudes. On the management's willingness to attend to employees' problems, there was no significant difference between those who regarded it as satisfactory or otherwise. In general. they seemed to be satisfied with the management's recognition of the workers contribution by providing rewards.

Table 20: Who Do Teams Refer For Help

	Managers	PMES	Facilitator	Other teams	Others
N	38	23	98	28	5
%	19.7	11.8	50	14.5	2.6

Whenever help was needed, 50% of the respondents asked the facilitators and some 20% asked the managers as shown in Table 20. The rest sought the assitance from other team members (14.5%), the Employee Development Department(11.8%) and 2.6%was said to have consulted their friends and engineers.

On the level of empowerment of the PPS teams in decision making, Table 21 showed that 68.5°o of the sample claimed it to be more than 50% of the decisions. While the rest. a smaller number claimed otherwise.

Table 21 : Level of Empowerment Given

	<25%	25-50%	51-75%	76-100%
N	11	48	85	48
%	5.5	24.7	43.8	24.7

A multiple-response question on the type of decisions that were empowered to the teams , received responses as summarized in Table 22.

Table 22: Types of Decision Empowered to Teams

Type of decisions	% responses
Budgeting and cost	11.7
The direction the team should take	61
Work and member's assignment or team project	77.9
Implementing own ideas	61
Communicate with higher level authority	37.7

* all figures above indicate only the percentage of 'yes ' responses

Results from this question showed that 77.9% of respondents were empowered to determine their work assignments and schedules and 61% of them said that they were given the autonomy to implement their own ideas. Another 61% of the respondents indicated that they could determine the direction that the team should take. While 37.7% said that they were allowed to communicate with higher authorities. However, in terms of budgeting and costing of the projects, only 11.7 % agreed that they had received the autonomy to undertake such decisions. This was especially true for non-mangement teams as approval from the management was needed before decisions on any purchase that was to be used in the project.

On the subject of rewards given to successful teams (Table 23), the respondents had varied perceptions. A total of 33.8 % of the respondents said that the rewards were sufficient but 40.5% said otherwise. However 21.6% of them thought that there were no variety of rewards and 4.1% said they were too costly.

Table 23: Perception on Rewards

	Sufficient	Insufficient	Too costly	No variety	Others
N	66	79	8	42	0
%	33.8	40.5	4.1	21.6	0

When the respondents were asked about the fairness of the evaluation criteria on performance of the PPS teams, more than half (60.3%) of them agreed that it was fair. The rest (39.7%) said it had not been fair as shown in Table 24. One of the reasons given on why the criteria was said to be unfair was that the team performance should have been evaluated based on the actual results, not just based on paper and public speaking presentations.

Table 24: Perceptions on Evaluation Criteria of PPS Teams

	Yes	No
N	147	78
%	60.3	39.7

Table 25 summarizes the views of the respondents on the ways in prolonging the lifecycle of PPS teams.

Table 25: Ways To Prolong The Lifecycle of PPS Team

Ways to prolong lifecycle of PPS	% responses
Active participation of management	66.2
Continuous motivation from leaders and facilitators	76.6
Appropriate rewards for team efforts	58.4
Submission of regular progress reports	53.2

* all figures above indicate only the percentage of 'yes ' responses

The table which sumarizes all the 'yes answers to a multiple-response question, revealed that 76.6% of the respondents believed that continuous motivation from leaders and facilitators were required to help prolong the life of the teams. Some (66.2%) of them suggested active participation of the management and 58.4% of them said that appropriate rewards for team efforts would be helpful. However, 53.2% of the respondents proposed the submission of regular progress reports to the management would help teams remain active.

The benefits that were achieved from participating in PPS teams are summarized in Table 26.

Table 26 : Benefits of PPS to the Individuals

Benefits to the individuals	% responses
Obtained computer knowledge & skills	44.2
Developed self esteem	62.3
Learnt to work with others as a team	71.4
Developed some hidden potential	67.5
Others	10.5

* all figures above indicate only the percentage of 'yes ' responses

Individually, the respondents were said to have benefited in terms of learning to work with others as a team as indicated by 71.4% of the sample The survey also showed that 67.5% of the respondents perceived that the PPS had helped to develop some of their hidden potentials and another 62.3% of them believed that it had helped developed their self esteem. Some 44.2% of them said that they had acquired computer knowledge and skills in the process and others had the chance to travel overseas to participate in the TCS competition.

Table 27 showed all the 'yes' responses of the samples with regard to their perception of the benefits which the organization had gained from setting up the PPS teams.

Table 27: Benefits to the Organization Gained from PPS

Benefits to the organization	% responses
Improved key performance indices and productivity	64.9
Improved communication between management and employees	57.1
Encouraged a harmonious working environment	58.4
Raised employees' morale	59.7
Promoted teamwork	63.6
Developed quality awareness among employees	58.4
Develop employees' potential	51.9

* all figures above indicate only the percentage of 'yes' responses

Almost 65% of the respondents believed that the PPS had helped to improve the organization's key performance indices and productivity while 63.6% of them noted that

it had promoted teamwork amongst the employees. Another 60% of them said that PPS had raised the employees' morale and 58.4% believed that it had encouraged a harmonious working environment. A similar percentage of the sample claimed that the PPS had helped to develop quality awareness among employees and 57% said that the PPS activities had improved communications between the managers and employees. Finally 52% of the respondents claimed that the PPS had helped develop employees' potentials. All these had contributed towards improved quality and productivity of the organization.

Based on these results, it can be observed that the respondents perceived the benefits of the PPS activities to be more than just tangible as indicated by the key performance indices. What was more important was that the PPS could contibute towards creating a healthy environment, where employees grow together with the organization.